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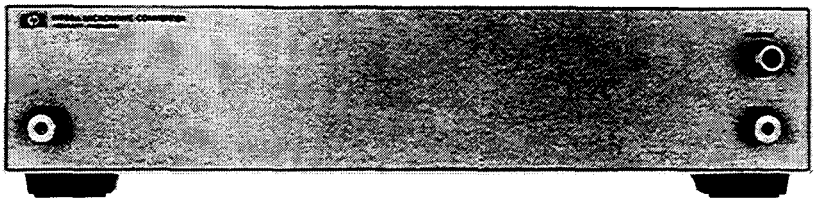
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OPERATING AND SERVICE MANUAL

HP 11793A MICROWAVE CONVERTER



September 1990
11793-90011

HEWLETT PACKARD

CERTIFICATION

Hewlett-Packard Company certifies that this product met its published specifications at the time of shipment from the factory. Hewlett-Packard further certifies that its calibration measurements are traceable to the United States National Bureau of Standards, to the extent allowed by the Bureau's calibration facility, and to the calibration facilities of other International Standards Organization members.

WARRANTY

This Hewlett-Packard instrument product is warranted against defects in material and workmanship for a period of one year from date of shipment. During the warranty period, Hewlett-Packard Company will at its option, either repair or replace products which prove to be defective.

For warranty service or repair, this product must be returned to a service facility designated by HP. Buyer shall prepay shipping charges to HP and HP shall pay shipping charges to return the product to Buyer. However, Buyer shall pay all shipping charges, duties, and taxes for products returned to HP from another country.

HP warrants that its software and firmware designated by HP for use with an instrument will execute its programming instructions when properly installed on that instrument. HP does not warrant that the operation of the instrument, or software, or firmware will be uninterrupted or error free.

LIMITATION OF WARRANTY

The foregoing warranty shall not apply to defects resulting from improper or inadequate maintenance by Buyer, Buyer-supplied software or interfacing, unauthorized modification or misuse, operation outside of the environmental specifications for the product, or improper site preparation or maintenance.

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ASSISTANCE

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For any assistance, contact your nearest Hewlett-Packard Sales and Service Office. Addresses are provided at the back of this manual.

Agilent Technologies, Inc.
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Agilent Technologies
Innovating the HP Way

June 8, 2000

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Sincerely,

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HP 11793A MICROWAVE CONVERTER

SERIAL NUMBERS

This manual applies directly to instruments with serial numbers prefixed 2520A.

With changes described in Paragraph 31, this manal also applies to instruments with serial numbers prefixed 2407A.

For additional important information about serial numbers, see INSTRUMENTS COVERED BY THIS MANUAL in Paragraph 4.

First Edition

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Operating and Service Manual Part No. 11793-90011
Microfiche Operating and Service Manual Part No. 11793-90012

Printed. MAY 1985

HEWLETT PACKARD

1 Regulatory Information

(Updated March 1999)

Safety Considerations

GENERAL

This product and related documentation must be reviewed for familiarization with safety markings and instructions before operation.

This product has been designed and tested in accordance with *IEC Publication 1010*, "Safety Requirements for Electronic Measuring Apparatus," and has been supplied in a safe condition. This instruction documentation contains information and warnings which must be followed by the user to ensure safe operation and to maintain the product in a safe condition.

SAFETY EARTH GROUND

A uninterruptible safety earth ground must be provided from the main power source to the product input wiring terminals, power cord, or supplied power cord set.

SAFETY SYMBOLS


Indicates instrument damage can occur if indicated operating limits are exceeded.


Indicates hazardous voltages.


Indicates earth (ground) terminal

WARNING	**A WARNING note denotes a hazard. It calls attention to a procedure, practice, or the like, which, if not correctly performed or adhered to, could result in personal injury. Do not proceed beyond a WARNING sign until the indicated conditions are fully understood and met.**

CAUTION	A CAUTION note denotes a hazard. It calls attention to an operation procedure, practice, or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the product. Do not proceed beyond an CAUTION note until the indicated conditions are fully understood and met.

Safety Considerations for this Instrument

WARNING **This product is a Safety Class I instrument (provided with a protective earthing ground incorporated in the power cord). The mains plug shall only be inserted in a socket outlet provided with a protective earth contact. Any interruption of the protective conductor inside or outside of the product is likely to make the product dangerous. Intentional interruption is prohibited.**

Whenever it is likely that the protection has been impaired, the instrument must be made inoperative and be secured against any unintended operation.

If this instrument is to be energized via an auto transformer (for voltage reduction), make sure the common terminal is connected to the earth terminal of the power source.

If this product is not used as specified, the protection provided by the equipment could be impaired. This product must be used in a normal condition (in which all means for protection are intact) only.

No operator serviceable parts in this product. Refer servicing to qualified personnel. To prevent electrical shock, do not remove covers.

Servicing instructions are for use by qualified personnel only. To avoid electrical shock, do not perform any servicing unless you are qualified to do so.

The opening of covers or removal of parts is likely to expose dangerous voltages. Disconnect the product from all voltage sources while it is being opened.

The power cord is connected to internal capacitors that my remain live for 5 seconds after disconnecting the plug from its power supply.

For Continued protection against fire hazard, replace the line fuse(s) only with 250 V fuse(s) or the same current rating and type (for example, normal blow or time delay). Do not use repaired fuses or short circuited fuseholders.

Always use the three-prong ac power cord supplied with this product. Failure to ensure adequate earth grounding by not using this cord may cause product damage.

This product is designed for use in Installation Category II and Pollution Degree 2 per *IEC 1010* and *IEC 664* respectively. FOR INDOOR USE ONLY.

This product has autoranging line voltage input, be sure the supply voltage is within the specified range.

To prevent electrical shock, disconnect instrument from mains (line) before cleaning. Use a dry cloth or one slightly dampened with water to clean the external case parts. Do not attempt to clean internally.

Ventilation Requirements: When installing the product in a cabinet, the convection into and out of the product must not be restricted. The ambient temperature (outside the cabinet) must be less than the maximum operating temperature of the product by 4° C for every 100 watts dissipated in the cabinet. If the total power dissipated in the cabinet is greater than 800 watts, then forced convection must be used.

Product Markings

CE - the CE mark is a registered trademark of the European Community. A CE mark accompanied by a year indicated the year the design was proven.

CSA - the CSA mark is a registered trademark of the Canadian Standards Association.

SAFETY CONSIDERATIONS

GENERAL

This product and related documentation must be reviewed before operation for familiarization with safety markings and instructions.

This product is a Safety Class I instrument (provided with a protective earth terminal).

BEFORE APPLYING POWER

Verify that the product is set to match the available line voltage and the correct fuse is installed.

SAFETY EARTH GROUND

An uninterruptible safety earth ground must be provided from the main power source to the product input wiring terminals, power cord, or supplied power cord set.

SAFETY SYMBOLS


Instruction manual symbol: the product will be marked with this symbol when it is necessary for the user to refer to the instruction manual (refer to Table of Contents).


Indicates hazardous voltages.


Indicates earth (ground) terminal.

WARNING The WARNING sign denotes a hazard. It calls attention to a procedure, practice, or the like, which, if not correctly performed or adhered to, could result in personal injury. Do not proceed beyond a WARNING sign until the indicated conditions are fully understood and met.

CAUTION The CAUTION sign denotes a hazard. It calls attention to an operating procedure, practice, or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the product. Do not proceed beyond a CAUTION sign until the indicated conditions are fully understood and met.

WARNING

Interrupting the protective (grounding) conductor (inside or outside the instrument) or disconnecting the protective earth terminal will cause a potential shock hazard that could result in personal injury. (Grounding one conductor of a two conductor outlet is not sufficient protection).

Whenever it is likely that the protection has been impaired, the instrument must be made inoperative and be secured against any unintended operation.

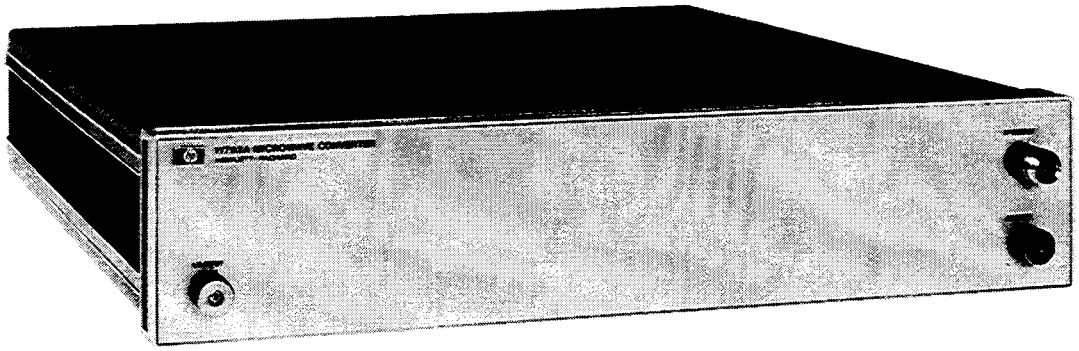
If this instrument is to be energized via an autotransformer (for voltage reduction), make sure the common terminal is connected to the earth terminal of the power source.

Servicing instructions are for use by service-trained personnel only. To avoid dangerous electric shock, do not perform any servicing unless qualified to do so.

Adjustments described in the manual are performed with power supplied to the instrument while protective covers are removed. Energy available at many points may, if contacted, result in personal injury.

Capacitors inside the instrument may still be charged even if the instrument has been disconnected from its source of supply.

For continued protection against fire hazard, replace the line fuse(s) only with 250V fuse(s) of the same current rating and type (for example, normal blow, time delay, etc.). Do not use repaired fuses or short-circuited fuseholders.



MODEL 11793A



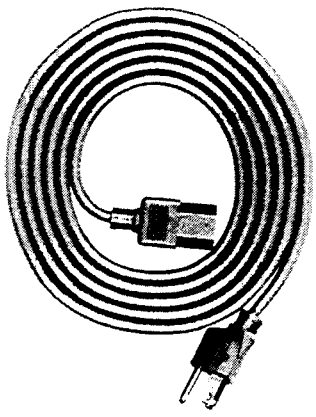
IF INPUT CABLE
(HP Part Number 11793-60006)



FREQUENCY CONTROL CABLE
(HP Part Number 8120-1838)



LO INPUT CABLE
(HP Part Number 11793-60009)



LINE POWER CABLE

Figure 1. HP Model 11793A Microwave Converter with Accessory Cables

1. GENERAL INFORMATION

This Operating and Service Manual contains information about initial inspection, operation, performance tests, adjustments, troubleshooting and repair of the HP Model 11793A Microwave Converter.

2. Specifications

The HP 11793A Microwave Converter does not have "hard specifications" against which the instrument can be tested for performance standards or limits. Instead, the Local Oscillator (LO) Requirements are listed in Table 1. These requirements are the performance standards or limits against which the instrument can be tested. The supplemental characteristics listed in Table 2 are not warranted requirements but are typical characteristics included as additional information for the user.

Table 1. LO Requirements

LO Amplitude Range	Frequency (GHz)	Conditions
+8 dBm to +13 dBm	2 to 18	Without Option 001, 011 or 021
+7 dBm to +13 dBm	18 to 26.5	Without Option 001, 011 or 021
0 dBm to +5 dBm	18 to 26.5	With Option 001, 011 or 021

Table 2. Supplemental Characteristics

RF Input Connector: Precision 3.5 mm male

LO Input Connector: Precision 3.5 mm male

IF Output Connector: Type-N female

Rear Panel Control Connector: BNC female

Dimensions:
Height: 88 mm (3.5 in.)
Width: 425 mm (16.7 in.)
Depth: 528 mm (20.8 in.)

HP System II Module Size:
Height: 88 mm (3.5 in.)
Width: 1 Modular Width
Depth: 508 mm (20 in.)

3. Safety Considerations

This product is a Safety Class I instrument; that is, one provided with a protective earth terminal. The Microwave Converter and all related documentation must be reviewed before operation for complete familiarization with safety markings and instructions. Refer to the Safety Considerations page found at the beginning of this manual for a summary of the safety information. Safety information pertinent to the task at hand (that is, installation, operation, performance testing, or service) is found throughout this manual.

4. Instruments Covered by This Manual

This instrument has a two-part serial number. The first four digits and the letter comprise the serial number prefix. The prefix is the same for all identical instruments; it changes only when a change is made to the instrument. The last five digits form a sequential suffix which is unique to each instrument. The contents of this manual apply directly to instruments having the serial prefix listed under Serial Numbers on the title page.

An instrument manufactured after the printing of this manual may have a serial prefix that is not listed on the title page. This unlisted serial prefix indicates that the manual for this instrument is supplied with a Manual Changes supplement that documents the differences.

In addition to change information, the supplement may contain information for correcting errors in the manual. To keep this manual as current and accurate as possible, Hewlett-Packard recommends that you periodically request the latest Manual Changes supplement. The supplement is identified with the manual print date and part number that appear on the title page. Complimentary copies of the supplement are available on request from your nearest Hewlett-Packard office.

For information concerning a serial prefix not listed on the title page or in the Manual Changes supplement, contact your nearest Hewlett-Packard office.

5. Description

The HP Model 11793A Microwave Converter down-converts microwave input signals in the range from 1.3 to 26.5 GHz. For frequencies below 1.3 GHz, signals are routed directly to the input of the measuring instrument. Instruments suitable for lower frequency measuring are the HP 8901B Modulation Analyzer or the HP 8902A Measuring Receiver.

For input signals above 1.3 GHz, the Microwave Converter routes the signal through an internal mixer which mixes the input signal with an external local oscillator. The difference frequency (that is, the intermediate frequency or IF) is filtered, amplified, and then appears at the IF OUTPUT connector. The IF should be between 10 and 700 MHz.

The Microwave Converter requires a +8 dBm leveled output from the LO. For LOs with insufficient power above 18 GHz, an optional internal amplifier (18 GHz to 26.5 GHz) is available. The measuring instrument controls switching of the RF path and of the LO amplifier via a rear-panel connection on the Microwave Converter.

6. Options and Accessories

Electrical Options

The options are summarized in Table 3. The following list describes each option:

Option 001. Adds an 18 to 26.5 GHz LO amplifier to the standard instrument.

Option 010. Moves the LO INPUT to the right side of the front panel.

Option 011. Moves the LO INPUT to the right side of the front panel and adds the 18 to 26.5 GHz LO amplifier.

Option 020. Moves all front-panel connectors to the rear panel.

Option 021. Moves all front-panel connectors to the rear panel and adds the 18 to 26.5 GHz LO amplifier.

Table 3. HP 11793A Option Guide

LO Amplifier	Front-Panel Placement of LO Input		Rear Panel Placement for All Connectors
	Left Side	Right Side	
Not Installed	Standard	Option 010	Option 020
Installed	Option 001	Option 011	Option 021

Mechanical Options

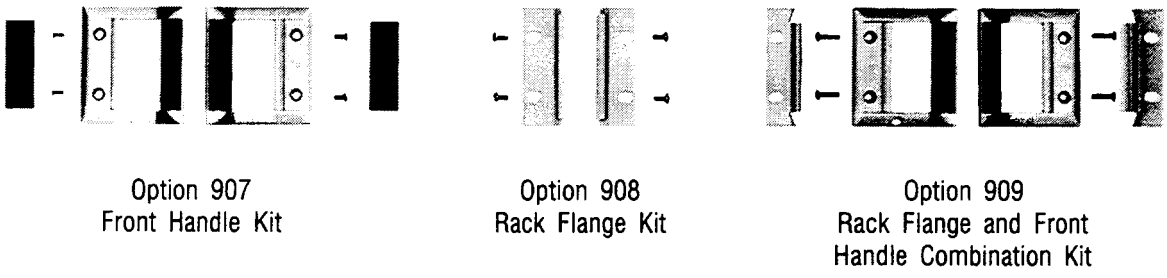
Instruments with Serial Prefix 2407A have System II cabinet parts and hardware that are English thread. Instruments with Serial Prefix 2520A and higher have System II cabinet parts and hardware that are METRIC thread.

When ordering Option 907, 908, or 909 for instruments with serial number prefix 2407A (English thread), use the HP part number in parenthesis.

Option 907 (Front-Handle Kit). Ease of handling is increased with front-panel handles. To retrofit a standard instrument, order HP part number 5061-9688 (5061-0088).

Option 908 (Rack-Flange Kit). All necessary hardware and installation instructions are included to enable mounting of the Microwave Converter in a rack with 482 mm (standard 19 in.) spacing. To retrofit a standard instrument, order HP part number 5061-9674 (5061-0074) which has standard 4.45 cm (1.75 in.) hole spacing.

Option 909 (Rack-Flange and Front-Handle Combination Kit). This kit is not simply a front-handle kit and rack-flange kit packaged together. The combination is made up of unique parts which include both functions. To retrofit a standard instrument, order HP part number 5061-9675 (5061-0075) which has 4.45 cm (1.75 in.) hole spacing and is a standard flange.



Option 907
Front Handle Kit

Option 908
Rack Flange Kit

Option 909
Rack Flange and Front
Handle Combination Kit

Figure 2. Rack Mounting Options

Accessories Supplied

The accessories supplied with the Microwave Converter are shown in Figure 1.

a. The line power cable may be supplied in several plug configurations, depending on the destination of the original shipment. Refer to the Paragraph 12 "**Power Cables**" in this manual.

b. Fuses with a 0.75A rating for both 115 and 230 Vac (HP part number 2110-0063) are supplied.

c. The control cable (HP part number 8120-1838) is a 30 cm (12 in.) flexible cable with male BNC 50 ohm connectors on each end. It connects to the frequency offset mode output of the measuring instrument.

d. The LO cable (HP part number 11793-60009) is a 36 cm (14.5 in.) flexible cable with 3.5 mm female end connectors. The LO cable includes a 3.5 mm male to Type-N male adapter. The cable connects to the output of the LO source. Options 001, 011, and 021 delete the adapter.

e. The IF cable (HP part number 11793-60006) is a 25 cm (10 in.) flexible cable with Type-N male 50 ohm end connectors. The cable connects to the RF input of the measuring instrument.

7. Recommended Test Equipment

Table 4 lists the test equipment recommended to check, adjust, and troubleshoot the Microwave Converter. The Minimum Specifications column describes the essential requirements for each piece of test equipment. If substitute equipment is used, it must meet or exceed the minimum specifications.

Table 4. Recommended Test Equipment

To Operate and Test the Microwave Converter		
Instrument Type	**Minimum Specification**	**Suggested Model**
Measuring Instrument	Contains specific circuitry to control the HP 11793A.	HP 8901B or HP 8902A*
Sensor Module	Must have a frequency range of 26.5 GHz and be compatible with the measuring instrument.	HP 11792A*
Microwave LO Source	See LO Amplitude Range in Table 1, LO Requirements. Note that the required output power depends on the LO amplifier option in the HP 11793A.	HP 8673B**
Microwave Signal Source	Frequency Range: 2 to 26.5 GHz Output Level: −1 to +1 dBm	HP 8673B
*No substitution recommended. **If the LO amplifier option is not in the HP 11793A use the HP 8673B Option 008.		
To Troubleshoot the Microwave Converter		
Instrument Type	**Minimum Specification**	
Multimeter	DC Volts Range: 100V DC Volts Accuracy: 2% AC Volts Range: 100V AC Volts Accuracy: 10% at 50 Hz	
Power Supply	Range: 0 to 5V Output: 10 mA	
RF Test Equipment	Troubleshooting of the microwave components of the Microwave Converter requires measurements to 26.5 GHz of gain or insertion loss, SWR, power, conversion loss, and frequency. Instruments which are required to perform these tasks include: signal generators and sweepers, network analyzers, spectrum analyzers, and power meters with accompanying couplers, pads, line stretchers, etc. Select the appropriate equipment and use standard test procedures to make these measurements.	

8. INSTALLATION

9. Initial inspection

Inspect the shipping container for damage. If the shipping container or cushioning material is damaged, the shipping materials should be kept until the contents of the shipment have been checked for completeness and the instrument has been checked mechanically and electrically. If there is mechanical damage or if the instrument does not pass the performance tests, notify the nearest Hewlett-Packard office. Keep the damaged shipping materials (if any) for inspection by the carrier and a Hewlett-Packard representative.

10. Power Requirements

The Microwave Converter requires a power source of 115, 230 Vac (+10%,-20%), 48 to 66 Hz. Power consumption is 20 VA maximum.

11. Line Voltage Selection

CAUTION

Before the instrument is plugged in, it must be set to the voltage of the power source, or damage to the instrument may result.

A line voltage switch enables selection of either 115V or 230V. The line voltage is indicated on this rear-panel switch. Slide the switch to the proper line voltage for operation.

12. Power Cables

WARNING

BEFORE CONNECTING THIS INSTRUMENT, the protective earth terminal of the instrument must be connected to the protective conductor of the (Mains) power cord. The Mains plug shall only be inserted in a socket outlet provided with a protective earth contact. The protective action must not be negated by the use of an extension cord (power cable) without a protective conductor (grounding). Grounding one conductor of a two-conductor outlet is not sufficient protection.

This instrument is provided with a three-wire power cable. When connected to an appropriate ac power receptacle, this cable grounds the instrument cabinet. The type of power-cable plug shipped with the instrument depends on the country of destination. See Table 5 for part numbers of the available power cables and Mains plugs.

13. Mating Connectors

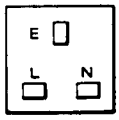
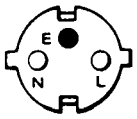
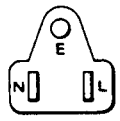
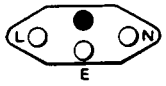
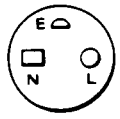
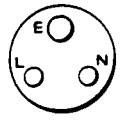
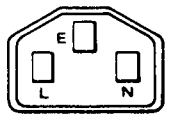
All coaxial connectors (except the RF Input) used with the Microwave Converter are provided on the three accessory cables supplied with the instrument listed under Paragraph 6, " **Accessories Supplied** ". The RF Input connector should be of the APC 3.5 mm female 50 ohm type. Refer to Table 2, *Supplemental Characteristics* for the correct type and location for mating each connector.

CAUTION

Use the correct torque wrench when installing sub-miniature connectors.

Tighten 3.5 mm connectors to 0.7 N·m (6.3 in.lb). Tighten Type-N connectors to 0.7 N·m (6.3 in.lb).

Table 2-2. *AC Power Cables Available*

Plug Type	Cable HP Part Number	C D	Plug Description	Cable Length (inches)	Cable Color	For Use In Country
250V 	8120-1351 8120-1703	0 4	Straight*BS1363A 90°	90 90	Mint Gray Mint Gray	United Kingdom, Cyprus, Nigeria, Rhodesia, Singapore
250V 	8120-1369 8120-0696	0 4	Straight*NZSS198/ASC112 90°	79 87	Gray Gray	Austrailia, New Zealand
250V 	8120-1689 8120-1692	7 2	Straight*CEE7-Y11 90°	79 79	Mint Gray Mint Gray	East and West Europe, Saudi Arabia, Egypt, (unpolarized in many nations)
125V 	8120-1378 8120-1398 8120-1754 8120-1378 8120-1521 8120-1676	5 5 7 1 6 2	Straight*NEMA5-15P 90° Straight*NEMA5-15P Straight*NEMA5-15P 90° Straight*NEMA5-15P	80 80 36 80 80 36	Black Black Black Jade Gray Jade Gray Jade Gray	United States, Canada, Mexico, Japan (100V or 200V), Philippines, Taiwan
250 V 	8120-2104	3	Straight*SEV1011 1959-24507 Type 12	79	Gray	Switzerland
250V 	8120-0698	6	Straight*NEMA6-15P			United States, Canada
220V 	8120-1957 8120-2956	2 3	Straight*DHCK107 90°	79 79	Gray Gray	Denmark
250V 	8120-4211	7	Straight*IEC83-B1	79	Black	South Africa, India
250V 	8120-1860	6	Straight*CEE22-VI (Systems Cabinet Use)			

*Part number shown for plug is industry identifier for plug only. Number shown for cable is HP Part Number for complete cable including plug.
E = Earth Ground; L = Line; N = Neutral

14. Operating Environment

The operating environment should be within the following limitations:

Temperature ..... 0°C to +55°C
Humidity ..... <95% relative at 40°C
Altitude ..... <4570 meters (15 000 feet)

15. Bench Operation

The instrument cabinet has plastic feet which are shaped to insure self-alignment when stacked in a system configuration.

16. Rack Mounting

Rack mounting information is provided with the rack mounting kits. If the kits were not ordered with the instrument as options, they may be ordered through the nearest Hewlett-Packard office. Refer to Paragraph 6, under "**Mechanical Options**" for kit information. See Figure 2, *Rack Mounting Options*.

17. Storage and Shipment

The instrument should be stored in a clean, dry environment. The following environmental limitations apply to both storage and shipment.

Temperature (Standard) ..... -55°C to +75°C
Temperature (Options 001, 011, and 021) .... -25°C to +75°C
Humidity ..... <95% relative
Altitude ..... 15 300 meters (50 000 feet)

18. Packaging

Original Packaging. Containers and materials identical to those used in factory packaging are available through Hewlett-Packard offices. If the instrument is being returned to Hewlett-Packard for servicing; attach a tag indicating the type of service required, return address, model number, and full serial number. Also, mark the container **FRAGILE** to ensure careful handling. In any correspondence refer to the instrument by model number and full serial number.

Other Packaging. The following general instructions should be used for repackaging the instrument with commercially available materials.

a. Wrap the instrument in heavy paper or plastic. (If shipping to a Hewlett-Packard office or service center, attach a tag indicating the type of service required, return address, model number, and full serial number.)

b. Use a strong shipping container. A double-wall carton made of 2.4 MPa (350 psi) test material is adequate.

c. Use enough shock-absorbing material; a 7.5 to 10.0 cm (3 to 4 in.) layer around all sides of the instrument to provide a firm cushion and to prevent movement in the container. Protect the front panel with cardboard.

d. Seal the shipping container securely.

e. Mark the shipping container **FRAGILE** to ensure careful handling.

19. Operation

WARNING

Before the Microwave Converter is plugged in, all protective earth terminals, extension cords, auto-transformers, and devices connected to it should be connected to a protective earth grounding socket. Any interruption of the protective earth grounding will cause a potential shock hazard that could result in personal injury.

CAUTION

Before the Microwave Converter is plugged in, it must be set to the same line voltage as the power source or damage to the instrument may result.

The HP 11793A Microwave Converter is designed to be operated remotely by the measuring instrument in its frequency offset mode. Operation of the Microwave Converter is, therefore, under control of the measuring instrument.

20. Operating Instructions

To operate the Microwave Converter, plug in the power cord and connect the signal and control cables as indicated in Figure 3, *Microwave Converter Interconnections and Test Set-up.* Refer to Table 1, *LO Requirements*, for LO power requirements.

CAUTION

This instrument does not have an on/off switch or front-panel power indicator light. Power is supplied to the instrument as soon as the power cord is plugged in to the line voltage source.

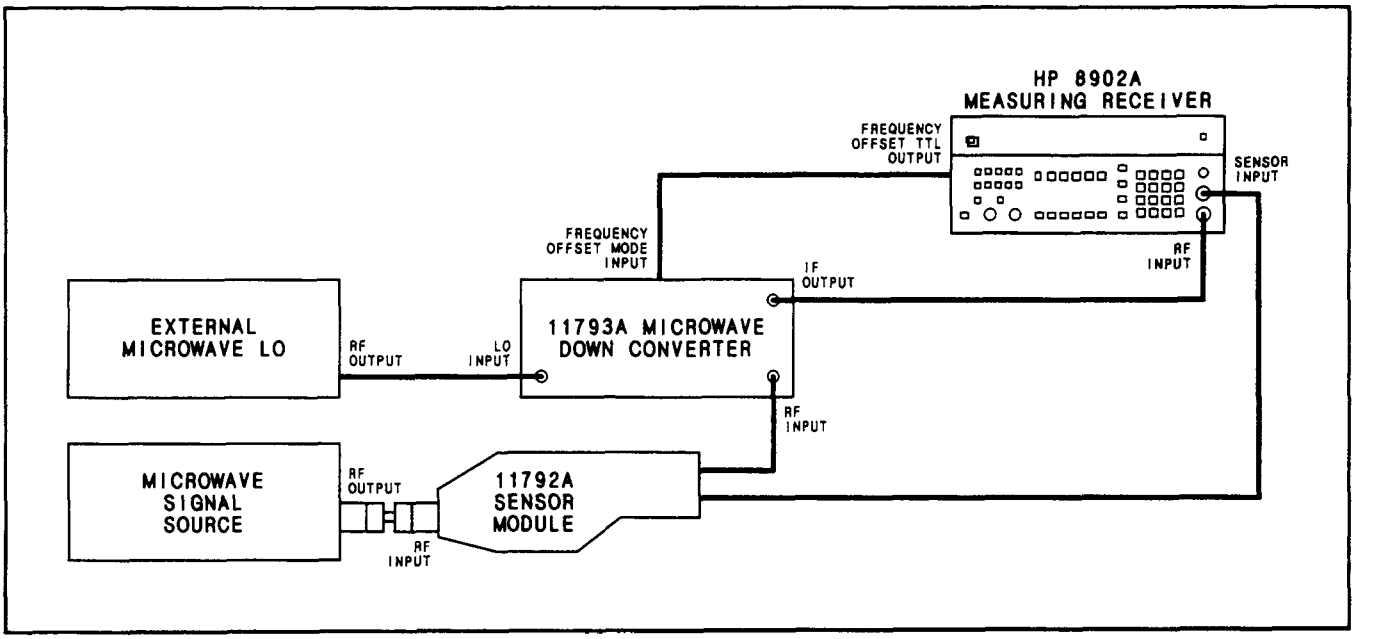


Figure 3. Microwave Converter Interconnections and Typical Test Setup

21. Panel Features

Front-panel features consist of the LO input, RF input, and the IF output connectors. For Options 020 and 021, the connectors are located on the rear panel. See Figure 4, *Front-Panel Features* for the standard locations of front-panel connectors.

Rear-panel features are the Line Voltage Select Switch, Fuse, Power Cord and the Frequency Offset input connectors. See Figure 5, *Rear-Panel Features*.

22. Operator Checks

Operator's checks consist of insuring that a fuse of proper value is installed, that the power cord is plugged in, that the signal/control lines are connected, and that both the measuring instrument and the external LO are connected and turned on.

23. Operator Maintenance

The only maintenance needed by the Microwave Converter is replacement of the primary power fuse.

To replace the fuse, insert a standard screwdriver into the fuseholder and push in against the spring. Turn counterclockwise (while pushing with a slight pressure) until the fuseholder is released. Remove and replace the fuse with a new fuse of identical value.

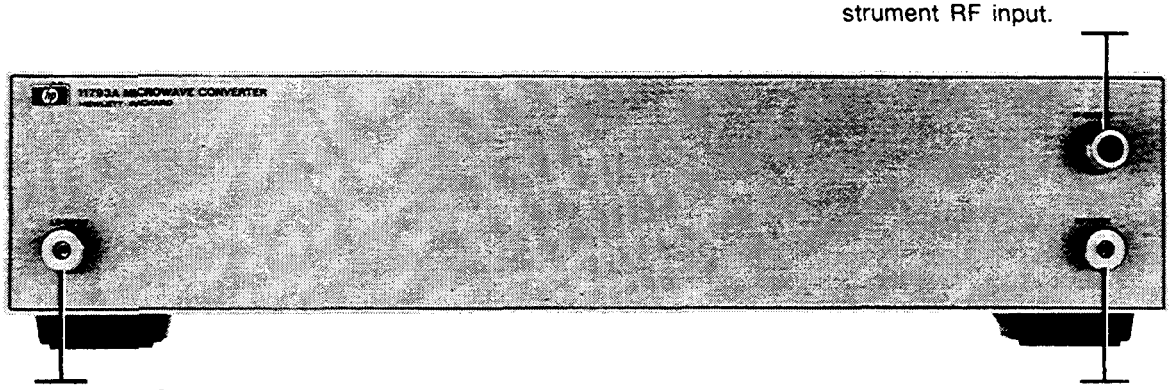


Figure 4. Front-Panel Features

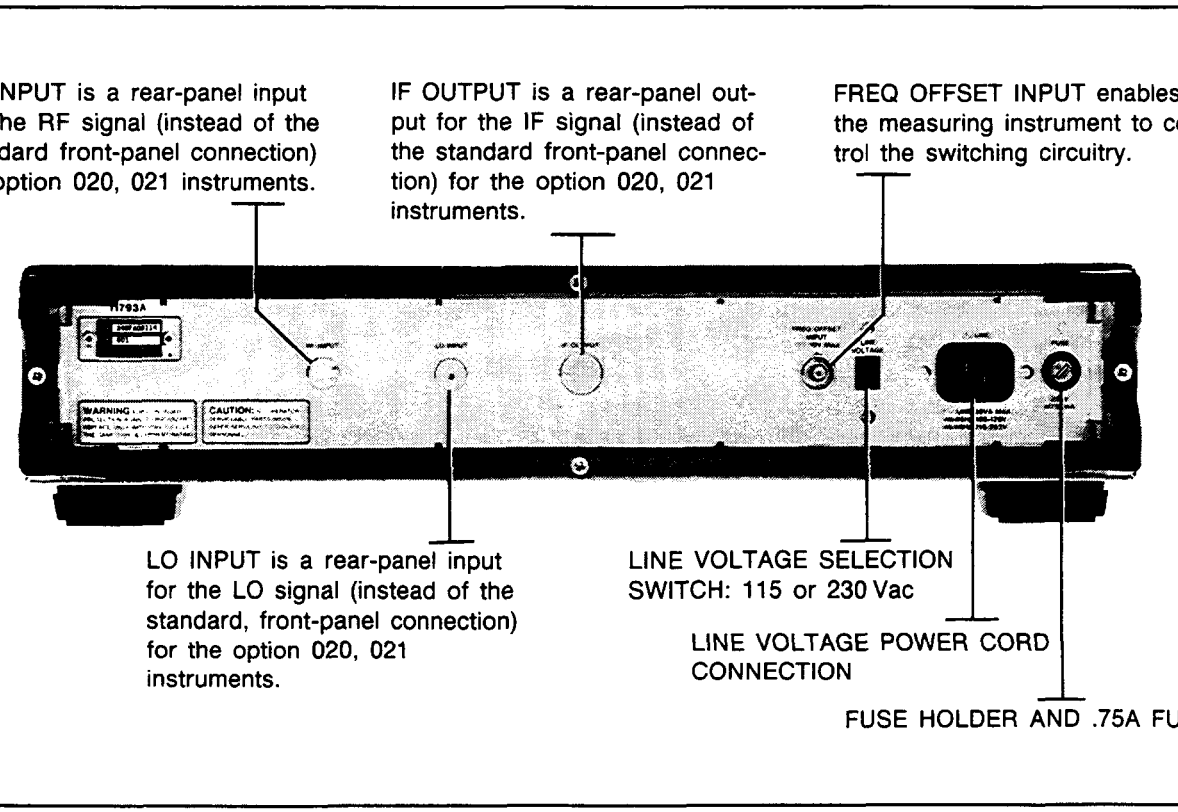


Figure 5. Rear-Panel Features

24. Performance Tests

Description

Performance testing consists of a general functional check to verify the instrument down-converts and switches RF paths properly. Since the Microwave Converter is designed to operate with specific HP instrumentation, no substitution is recommended.

Equipment

Measuring Instrument	HP 8901B or HP 8902A
Sensor Module	HP 11792A
Microwave LO Source	See Table 4
Microwave Signal Source	HP 8673B (up to 26 GHz w Amplifier) HP 8673B Option 008 (up to 26 GHz, (w/o Amplifier) HP 8672A Option 008 (up to 18 GHz, w/o Amplifier)
RF Signal Source	HP 8642B, HP 8660C/86602B, HP 8662A, HP 8663A

Procedure

1. Connect the equipment as shown in Figure 3. Set the two microwave sources to CW. Set the microwave signal source to 0 dBm.

NOTE

Check that the measuring instrument's RF Power calibration factors match the sensor module. The measuring instrument must be in frequency offset mode in order to enter the RF Power calibration factors into the Frequency Offset mode RF Power Cal Factor Table.

2. Set the microwave LO source frequency and level as listed in Table 6. *Performance Tests Instrument Settings*. For each setting, perform the following steps:

   a. Set the frequency of the microwave signal source as listed.

   b. On the measuring instrument, key in 27.3 SPCL. Key in the frequency of the microwave LO source (in MHz), then press the MHz key.

   c. On the measuring instrument, measure RF frequency and RF Power (in that order). The measuring instrument's display should read as indicated in table 6. (The listed frequency is a nominal value.)

3. Set the RF signal source to 1270 MHz. and level -10 dBm.

4. On the measuring instrument, key in 27.3 SPCL and enter 0 MHz. This leaves the measuring instrument in frequency offset mode with 0 MHz offset. Measure RF Frequency and RF Power (in that order).

Table 6. Performance Test Instrument Settings

LO Source		Signal Source		Measuring Instrument Display
Frequency (MHz)	Level (dBm)	Frequency (MHz)	Level (dBm)	Frequency (MHz)
2 063	+8	2 000	−15	2 000
10 063	+8	10 000	−15	10 000
17 263	+8	17 200	−15	17 200
18 063	0 *	18 000	−15	18 000
18 063	+8**	18 000	−15	18 000
25 963***	0*	25 900	−15	25 900
25 963***	+8**	25 900	−15	25 900

*Use this level only if the LO amplifier is installed (Option 001, 011 or 021).
**Use this level only if the LO amplifier is not installed (Option 001, 011 or 021).
***Omit this step if maximum system frequency is 18 GHz.

25. Adjustments

The only adjustment necessary is setting the +12V power supply. Connect a dc voltmeter to the case of VR3. (See Service Sheet 3.) Adjust A1R5 on the A1 Switch Control Assembly until the voltage is between +11.9 and +12.1 Vdc.

26. Replaceable Parts

Table 7 lists all replaceable parts in alphanumeric order by reference designator. Table 8 contains the names and addresses that correspond to the manufacturer's code numbers.

27. Replaceable Parts List

Table 7, *Replaceable Parts*, is organized as follows:

a. Electrical assemblies and their components in alphanumeric order by reference designation.

b. Chassis-mounted parts and mechanical parts in alphanumeric order by reference designation.

The following information is provided for each part:

a. The Hewlett-Packard part number.

b. Part number check digit (CD).

c. The total quantity (Qty) is provided on the first entry of the part number.

d. The description of the part.

e. A typical manufacturer of the part in a five-digit code.

f. The manufacturer's number for the part.

28. Parts List Updating (Manual Changes Supplement)

Production changes to the instrument made after the publication date of this manual are denoted by a change in the serial-number prefix. Changes to the parts list are recorded by serial prefix on a Manual Changes supplement. Also, errors in the manual are noted in the Errata portion of the Manual Changes supplement.

29. Illustrated Parts Breakdowns

The components that compose the Microwave Converter are illustrated in the component locator diagrams in Figure 13, and in the illustrated parts breakdown photographs of Figures 7 and 8.

Table 7. Replaceable Parts

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A1						
A1	11793-60001	4	1	SWITCH CONTROL ASSEMBLY	28480	11793-60001
A1C1	0180-0197	8	1	CAPACITOR-FXD 2.2UF+-10% 20VDC TA	56289	150D225X9020A2
A1C2	0180-2302	1	1	CAPACITOR-FXD 200UF+75-10% 50VDC AL	56289	39D207G050FJ6-DSB
	1400-0249	0	1	CABLE TIE .062-.625-DIA .091-WD NYL	06383	PLT1M-8
A1C3	0180-1794	3	1	CAPACITOR-FXD 22UF+-10% 35VDC TA	56289	150D226X9035R2
A1C4	0160-5098	6	3	CAPACITOR-FXD .22UF +-10% 50VDC CER	16299	CAC05X7R224J050A
A1C5	0160-5098	6		CAPACITOR-FXD .22UF +-10% 50VDC CER	16299	CAC05X7R224J050A
A1C6	0160-5098	6		CAPACITOR-FXD .22UF +-10% 50VDC CER	16299	CAC05X7R224J050A
A1C7	0160-4832	4	1	CAPACITOR-FXD .01UF +-10% 100VDC CER	28480	0160-4832
A1C8	0160-5555	0	1	CAPACITOR-FXD .33UF +-5% 100VDC	28480	0160-5555
A1CR1	1901-0028	5	2	DIODE-PWR RECT 400V 750MA DO-29	28480	1901-0028
A1CR2	1901-0028	5		DIODE-PWR RECT 400V 750MA DO-29	28480	1901-0028
A1CR3	1901-0050	3	7	DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1CR4	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1CR5	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1CR6	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1CR7	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1CR8	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1CR9	1901-0050	3		DIODE-SWITCHING 80V 200MA 2NS DO-35	28480	1901-0050
A1DS1	1990-0717	6	1	LED-LAMP LUM-INT=800UCD IF=30MA-MAX	28480	HLMP-1501
A1J1	1251-5717	0	1	CONNECTOR 10-PIN M POST TYPE	28480	1251-5717
A1Q1	1884-0273	4	1	THYRISTOR-SCR 2N4101 TO-66	3L585	2N4101
	0515-0655	4		SCREW-MACH M3 X 0.5 8MM-LG PAN-HD	00000	ORDER BY DESCRIPTION
A1Q2	1854-0477	7	4	TRANSISTOR NPN 2N2222A SI TO-18 PD=500MW	04713	2N2222A
A1Q3	1854-0477	7		TRANSISTOR NPN 2N2222A SI TO-18 PD=500MW	04713	2N2222A
A1Q4	1854-0477	7		TRANSISTOR NPN 2N2222A SI TO-18 PD=500MW	04713	2N2222A
A1Q5	1854-0477	7		TRANSISTOR NPN 2N2222A SI TO-18 PD=500MW	04713	2N2222A
A1R1	0757-0821	8	1	RESISTOR 1.21K 1% .5W F TC=0+-100	28480	0757-0821
A1R2	0698-3442	9	3	RESISTOR 237 1% .125W F TC=0+-100	24546	C4-1/8-T0-237R-F
A1R3	0698-3442	9		RESISTOR 237 1% .125W F TC=0+-100	24546	C4-1/8-T0-237R-F
A1R4	0698-3442	9		RESISTOR 237 1% .125W F TC=0+-100	24546	C4-1/8-T0-237R-F
A1R5	2100-0568	1	1	RESISTOR-TRMR 100 10% C TOP-ADJ 1-TRN	28480	2100-0568
A1R6	0698-3150	6	10	RESISTOR 2.37K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2371-F
A1R7	0757-0984	4	1	RESISTOR 10 1% .5W F TC=0+-100	28480	0757-0984
A1R8	0698-3150	6		RESISTOR 2.37K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2371-F
A1R9	0757-0438	3	1	RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A1R10	0698-3150	6		RESISTOR 2.37K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2371-F
A1R11	0757-0444	1	1	RESISTOR 12.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1212-F
A1R12	0698-3150	6		RESISTOR 2.37K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2371-F
A1R13	0698-3150	6		RESISTOR 2.37K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2371-F
A1R14	0698-3150	6		RESISTOR 2.37K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2371-F
A1R15	0698-3150	6		RESISTOR 2.37K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2371-F
A1R16	0698-3150	6		RESISTOR 2.37K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2371-F
A1R17	0698-3150	6		RESISTOR 2.37K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2371-F
A1R18	0698-3150	6		RESISTOR 2.37K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2371-F
A1U1	1826-0191	3	1	IC COMPARATOR GP DUAL TO-100 PKG	27014	LM319H
A1U2	1820-1417	6	1	IC GATE TTL LS NAND QUAD 2-INP	01295	SN74LS26N
A1U3	1820-1197	9	1	IC GATE TTL LS NAND QUAD 2-INP	01295	SN74LS00N
A1VR1	1902-3323	1	1	DIODE-ZNR 42.2V 5% DO-35 PD=.4W TC=+.08%	28480	1902-3323
A1VR2	1902-0960	6	1	DIODE-ZNR 12V 5% DO-35 PD=.4W TC=+.077%	28480	1902-0960
A1VR3	1826-0423	4	1	IC V RGLTR TO-3	27014	LM317K
	0340-0875	9	1	INSULATOR-XSTR THRM-CNDCT	28480	0340-0875
	0515-0655	4	4	SCREW-MACH M3 X 0.5 8MM-LG PAN-HD	00000	ORDER BY DESCRIPTION
	0535-0004	9	2	NUT-HEX DBL-CHAM M3 X 0.5 2.4MM-THK	00000	ORDER BY DESCRIPTION
	2190-0584	0	2	WASHER-LK HLCL 3.0 MM 3.1-MM-ID	28480	2190-0584
	11793-00015	4	1	HEAT SINK	28480	11793-00015
A1VR4	1826-0367	5	1	IC 78M05C V RGLTR TO-39	04713	MC78M05CG

See introduction to this section for ordering information. * Indicates factory selected value

Table 7. Replaceable Parts

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
AT1	11793-60003	6	1	3 DB ATTENUATOR	28480	11793-60003
F1	2110-0063	2	1	FUSE .75A 250V NTD 1.25X.25 UL	28480	2110-0063
	2110-0566	0	1	FUSEHOLDER-EXTR POST 12A 250 V	28480	2110-0566
	2110-0565	9	1	FUSEHOLDER CAP 12A MAX FOR UL	28480	2110-0565
	2110-0569	3	1	FUSEHOLDER COMPONENT NUT; THREAD M12.7	28480	2110-0569
	2190-0068	5	1	WASHER-LK INTL T 1/2 IN .505-IN-ID	28480	2190-0068
FL1	9135-0229	1	1	FILTER-LOW PASS DC TO 800MHZ; M/F SMA	28480	9135-0229
	1400-0025	0	2	CLAMP-CABLE .5-DIA .5-WD NYL	28480	1400-0025
	0515-0381	3	17	SCREW-MACH M4 X 0.7 10MM-LG PAN-HD	00000	ORDER BY DESCRIPTION
	0535-0006	1	1	NUT-HEX DBL-CHAM M4 X 0.7 3.2MM-THK	00000	ORDER BY DESCRIPTION
	2190-0586	2	22	WASHER-LK HLCL 4.0 MM 4.1-MM-ID	28480	2190-0586
	3050-0893	9	3	WASHER-FL MTLC 4.0 MM 4.4-MM-ID	28480	3050-0893
J1	08673-60040	9	5	CONNECTOR ASSEMBLY "LO INPUT" (LEFT SIDE: STANDARD ONLY)	28480	08673-60040
	2190-0016	3	5	WASHER-LK INTL T 3/8 IN .377-IN-ID	28480	2190-0016
	2950-0043	8	5	NUT-HEX-DBL-CHAM 3/8-32-THD .094-IN-THK	00000	ORDER BY DESCRIPTION
J2	11793-60008	1	2	CONNECTOR ASSEMBLY TYPE-N "IF OUTPUT" (STANDARD AND OPTION 010 ONLY)	28480	11793-60008
	1250-0914	7	2	CONNECTOR-RF APC-N FEM UNMTD 50-OHM	28480	1250-0914
	1250-0915	8	2	CONTACT-RF CONN SER APC-N FEMALE	9D949	131-149
	5040-0306	0	2	INSULATOR	28480	5040-0306
	08671-2027	5	2	INSULATOR	28480	08671-2027
	08555-20093	5	2	CONTACT JACK	28480	08555-20093
	08555-20094	6	2	BODY, BULKHEAD	28480	08555-20094
	2190-0104	0	2	WASHER-LK INTL T 7/16 IN .439-IN-ID	28480	2190-0104
	2950-0132	6	6	NUT-HEX-DBL-CHAM 7/16-28-THD .094-IN-THK	00000	ORDER BY DESCRIPTION
J3	08673-60040	9		CONNECTOR ASSEMBLY "RF INPUT" (STANDARD AND OPTION 010 ONLY)	28480	08673-60040
	2190-0016	3		WASHER-LK INTL T 3/8 IN .377-IN-ID	28480	2190-0016
	2950-0043	8		NUT-HEX-DBL-CHAM 3/8-32-THD .094-IN-THK	00000	ORDER BY DESCRIPTION
J4	08673-60040	9		CONNECTOR ASSEMBLY "LO INPUT" (RIGHT SIDE: OPTION 010 ONLY)	28480	08673-60040
	2190-0016	3		WASHER-LK INTL T 3/8 IN .377-IN-ID	28480	2190-0016
	2950-0043	8		NUT-HEX-DBL-CHAM 3/8-32-THD .094-IN-THK	00000	ORDER BY DESCRIPTION
J5	08673-60040	9		CONNECTOR ASSEMBLY "RF INPUT" (REAR PANEL: OPTION 020 ONLY)	28480	08673-60040
	2190-0016	3		WASHER-LK INTL T 3/8 IN .377-IN-ID	28480	2190-0016
	2950-0043	8		NUT-HEX-DBL-CHAM 3/8-32-THD .094-IN-THK	00000	ORDER BY DESCRIPTION
J6	08673-60040	9		CONNECTOR ASSEMBLY "LO INPUT" (REAR PANEL: OPTION 020 ONLY)	28480	08673-60040
	2190-0016	3		WASHER-LK INTL T 3/8 IN .377-IN-ID	28480	2190-0016
	2950-0043	8		NUT-HEX-DBL-CHAM 3/8-32-THD .094-IN-THK	00000	ORDER BY DESCRIPTION
J7	11793-60008	1		CONNECTOR ASSEMBLY TYPE-N "IF OUTPUT" (REAR PANEL: OPTION 020 AND 021 ONLY)	28480	11793-60008
	1250-0914	7		CONNECTOR-RF APC-N FEM UNMTD 50-OHM	28480	1250-0914
	1250-0915	8		CONTACT-RF CONN SER APC-N FEMALE	9D949	131-149
	5040-0306	0		INSULATOR	28480	5040-0306
	08671-2027	5		INSULATOR	28480	08671-2027
	08555-20093	5		CONTACT JACK	28480	08555-20093
	08555-20094	6		BODY, BULKHEAD	28480	08555-20094
	2190-0104	0		WASHER-LK INTL T 7/16 IN .439-IN-ID	28480	2190-0104
	2950-0132	6		NUT-HEX-DBL-CHAM 7/16-28-THD .094-IN-THK	00000	ORDER BY DESCRIPTION
J8	1250-0870	4	1	CONNECTOR-RF BNC FEM SGL-HOLE-RR 50-OHM "FREQUENCY OFFSET INPUT"	28480	1250-0870
J9				PART OF W12 (NOT SEPARATELY REPLACEABLE)		
J10				PART OF W10/W11 (NOT SEPARATELY REPLACEABLE)		
2520A AND ABOVE						
MP1	5021-5801	0	1	FRAME FRONT	28480	5021-5801
	0515-1227	8	6	SCREW-MACH M3 X 0.5 6MM-LG 90-DEG-FLH-HD	00000	ORDER BY DESCRIPTION
MP2	5021-5832	7	2	SIDE STRUT	28480	5021-5832
	0515-1331	5	8	SCREW-MACH M4 X 0.7 6MM-LG FLATHD	00000	ORDER BY DESCRIPTION
2407A ONLY						
MP1	5020-8801	4	1	FRONT FRAME	28480	5020-8801
	0515-1227	8	6	SCREW-MACH M3 X 0.5 6MM-LG 90-DEG-FLH-HD	28480	0515-1227
MP2	5020-8832	1	2	SIDE STRUT	28480	5020-8832
	2510-0192	6	8	SCREW-MACH 8-32 .25-IN-LG 100 DEG	00000	ORDER BY DESCRIPTION

See introduction to this section for ordering information. * Indicates factory selected value

Table 7. Replaceable Parts

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
2407A ONLY						
MP3	5020-8802	5	1	REAR FRAME	28480	5020-8802
	0515-0680	5	12	SCREW-MACH M3 X 0.5 6MM-LG PAN-HD	28480	0515-0680
	0590-1203	8		THREADED INSERT-NUT M3X0.5 .059-IN-LG	28480	0590-1203
MP4	5040-7202	9	1	TOP TRIM STRIP	28480	5040-7202
MP5	5001-0438	7	2	SIDE TRIM 3 1/2	28480	5001-0438
2520A AND ABOVE						
MP6	5061-9435	8	1	COVER, TOP	28480	5061-9435
MP7	5061-9452	9	1	COVER, SIDE	28480	5061-9452
MP8	11793-20009	8	1	REAR PANEL ASSEMBLY	28480	11793-20009
2407A ONLY						
MP6	5060-9835	0	1	TOP COVER	28480	5060-9835
MP7	5060-9852	1	2	SIDE COVER	28480	5060-9852
MP8	11793-00004	9	1	REAR PANEL	28480	11793-00004
MP9	11793-00005	2	1	FRONT DRESS PANEL (EXCEPT OPTIONS 010 AND 011)	28480	11793-00005
	11793-00012	1	1	FRONT DRESS PANEL (OPTIONS 010 AND 011 ONLY)	28480	11793-00012
MP10	11793-00003	0	1	FRONT SUB-PANEL	28480	11793-00003
2520A AND ABOVE						
MP11	5061-9447	2	1	COVER, BOTTOM	28480	5061-9447
2407A ONLY						
MP11	5060-9847	4	1	BOTTOM COVER	28480	5060-9847
MP12	5040-7201	8	1	FOOT FULL-1/2MOD	28480	5040-7201
MP13	11793-00001	8	1	MAIN DECK	28480	11793-00001
	0380-1705	0	3	STANDOFF-1/4 TURN 6.35 MM LG; 10.16 MM	28480	0380-1705
	0515-0381	3		SCREW-MACH M4 X 0.7 10MM-LG PAN-HD	00000	ORDER BY DESCRIPTION
	2190-0586	2		WASHER-LK HLCL 4.0 MM 4.1-MM-ID	28480	2190-0586
MP14	11793-20005	4	1	MIXER HOUSING MD	28480	11793-20005
	0515-0381	3		SCREW-MACH M4 X 0.7 10MM-LG PAN-HD	00000	ORDER BY DESCRIPTION
	2190-0586	2		WASHER-LK HLCL 4.0 MM 4.1-MM-ID	28480	2190-0586
MP15	8160-0472	8		RFI STRIP (* ORDER QTY 2 FT)	28480	8160-0472
MP16	11793-00002	9	1	RF COVER	28480	11793-00002
	0515-0381	3		SCREW-MACH M4 X 0.7 10MM-LG PAN-HD	00000	ORDER BY DESCRIPTION
	2190-0586	2		WASHER-LK HLCL 4.0 MM 4.1-MM-ID	28480	2190-0586
MP17	11793-00014	3	1	AMPLIFIER BRACKET (OPTIONS 001, 011 AND 020 ONLY)	28480	11793-00014
	0515-0680	5		SCREW-MACH M3 X 0.5 6MM-LG PAN-HD	28480	0515-0680
MP18	11793-00007	4	1	MIXER BRACKET	28480	11793-00007
	0515-0373	3	2	SCREW-MACH M3 X 0.5 10MM-LG PAN-HD	00000	ORDER BY DESCRIPTION
	0520-0130	1	4	SCREW-MACH 2-56 .375-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
	2190-0045	8	4	WASHER-LK HLCL NO. 2 .088-IN-ID	28480	2190-0045
	2190-0584	0	12	WASHER-LK HLCL 3.0 MM 3.1-MM-ID	28480	2190-0584
	3050-0098	6	2	WASHER-FL MTLC NO. 2 .094-IN-ID	28480	3050-0098
	3050-0891	7	8	WASHER-FL MTLC 3.0 MM 3.3-MM-ID	28480	3050-0891
	3050-0893	9		WASHER-FL MTLC 4.0 MM 4.4-MM-ID	28480	3050-0893
MP19	11793-00017	6	1	STIFFENER BAR	28480	11793-00017
MP20	11793-00006	3	1	TRANSFORMER BRACKET	28480	11793-00006
	0515-0381	3		SCREW-MACH M4 X 0.7 10MM-LG PAN-HD	00000	ORDER BY DESCRIPTION
	2190-0586	2		WASHER-LK HLCL 4.0 MM 4.1-MM-ID	28480	2190-0586
MP21	6960-0023	9	1	PLUG-HOLE DOME-HD FOR .312-D-HOLE STL	28480	6960-0023
MP22	6960-0009	1	2	PLUG-HOLE FL-HD FOR .438-D-HOLE BRS	28480	6960-0009
MP23				NOT ASSIGNED		
MP24				NOT ASSIGNED		
MP25	11793-20007	6	3	GROMMET, SEMI-RIGID CABLE	28480	11793-20007
S1	11793-60002	5	2	COAXIAL SWITCH (OPTIONS 001, 011 AND 021 ONLY)	28480	11793-60002
	0515-0446	1	6	SCREW-MACH M3 X 0.5 22MM-LG PAN-HD	28480	0515-0446
S2	11793-60002	5		COAXIAL SWITCH (EXCEPT OPTIONS 001, 011 AND 021)	28480	11793-60002
	0515-0446	1		SCREW-MACH M3 X 0.5 22MM-LG PAN-HD	28480	0515-0446
T1	9100-4014	7	1	TRANSFORMER PWR 115/230V	28480	9100-4014
	0515-1137	9	4	SCREW-MACH M3 X 0.5 50MM-LG PAN-HD	28480	0515-1137
	2190-0584	0		WASHER-LK HLCL 3.0 MM 3.1-MM-ID	28480	2190-0584
	3050-0891	7		WASHER-FL MTLC 3.0 MM 3.3-MM-ID	28480	3050-0891
	7120-4559	5	2	LABEL-WARNING .5-IN-WD 1-IN-LG MYLAR	28480	7120-4559

See introduction to this section for ordering information.

* Indicates factory selected value

Table 7. Replaceable Parts

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
U1	0955-0218	7	1	AMPLIFIER-MICROWAVE FREQ RANGE: 18GHZ TO (OPTIONS 001, 011 AND 021 ONLY)	28480	0955-0218
	0520-0130	1		SCREW-MACH 2-56 .375-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
U2	0955-0237	0	1	AMPLIFIER-RF MOD, SMA	28480	0955-0237
	0520-0133	4	2	SCREW-MACH 2-56 .5-IN-LG PAN-HD-POZI	00000	ORDER BY DESCRIPTION
	2190-0045	8		WASHER-LK HLCL NO. 2 .088-IN-ID	28480	2190-0045
	2950-0132	6		NUT-HEX-DBL-CHAM 7/16-28-THD .094-IN-THK	00000	ORDER BY DESCRIPTION
U3	0955-0217	6	1	MIXER-MICROWAVE FREQ RANGE: LO: 2.0GHZ	28480	0955-0217
	0515-0680	5		SCREW-MACH M3 X 0.5 6MM-LG PAN-HD	28480	0515-0680
	2190-0584	0		WASHER-LK HLCL 3.0 MM 3.1-MM-ID	28480	2190-0584
	3050-0891	7		WASHER-FL MTLC 3.0 MM 3.3-MM-ID	28480	3050-0891
W1	11793-20002	1	1	LO INPUT CABLE, SEMI-RIGID: J1 TO U3 (STANDARD ONLY)	28480	11793-20002
W2	11793-20003	2	1	IF OUTPUT CABLE, SEMI-RIGID: J2 TO S2 (STANDARD AND OPTIONS 001, 010 AND 011 ONLY)	28480	11793-20003
W3	11793-20004	3	1	RF INPUT CABLE, SEMI-RIGID: J3 TO S2 (STANDARD AND OPTIONS 001, 010 AND 011 ONLY)	28480	11793-20004
W4	11793-20101	1	1	LO INPUT CABLE, SEMI-RIGID: J1 TO S1 (LEFT SIDE: OPTION 001 ONLY)	28480	11793-20101
W5	11793-20103	3	1	LO AMPLIFIER OUTPUT CABLE, SEMI-RIGID: U1 TO S1 (OPTIONS 001, 011 AND 021 ONLY)	28480	11793-20103
W6	11793-20102	2	1	MIXER INPUT CABLE, SEMI-RIGID: S1 TO U3 (OPTIONS 001, 011 AND 021 ONLY)	28480	11793-20102
W7	11793-60013	8	2	MIXER OUTPUT CABLE ASSEMBLY, FLEX-COAX (912): U3 TO FL1	28480	11793-60013
W8	11793-60013	8		IF AMPLIFIER OUTPUT CABLE ASSEMBLY, FLEX-COAX (912): U2 TO S2	28480	11793-60013
W9	11793-20104	4	1	LO AMPLIFIER INPUT CABLE, SEMI-RIGID: S1 TO U1 (OPTIONS 001, 011 AND 021 ONLY)	28480	11793-20104
W10	11793-60011	6	1	MODULE HARNESS ASSEMBLY (STANDARD AND OPTIONS 010 AND 020 ONLY)	28480	11793-60011
	0515-1084	5	4	SCREW-MACH M3 X 0.5 12MM-LG PAN-HD	28480	0515-1084
	0535-0004	9	4	NUT-HEX DBL-CHAM M3 X 0.5 2.4MM-THK	00000	ORDER BY DESCRIPTION
	2190-0584	0		WASHER-LK HLCL 3.0 MM 3.1-MM-ID	28480	2190-0584
W11	11793-60012	7	1	MODULE HARNESS ASSEMBLY (OPTIONS 001, 011, AND 021 ONLY)	28480	11793-60012
W12	11793-60007	0	1	MODULE CABLE, FLAT: A1J1 TO J9	28480	11793-60007
	0535-0004	9		NUT-HEX DBL-CHAM M3 X 0.5 2.4MM-THK	00000	ORDER BY DESCRIPTION
	2190-0584	0		WASHER-LK HLCL 3.0 MM 3.1-MM-ID	28480	2190-0584
W13	11793-60010	5	1	CABLE ASSEMBLY, COAX: J8 TO A1	28480	11793-60010
	1250-0952	3	1	CONTACT-RF CONN BNC/TNC:FEM CTR	24931	C232-2
	1250-0958	9	1	BUSHING RF CONN BNC/TNC: FOR INTL	24931	CS 105-3
	1250-0960	3	1	SLEEVE-RF CONN SER BNC/TNC	28480	1250-0960
	1250-0964	7	1	NUT-RF CONN BNC/TNC: CLAMP NUT FOR	24931	N126-2
	1400-0025	0		CLAMP-CABLE .5-DIA .5-WD NYL	28480	1400-0025
	2190-0102	8	1	WASHER-LK INTL T 15/32 IN .472-IN-ID	28480	2190-0102
	2950-0035	8	1	NUT-HEX-DBL-CHAM 15/32-32-THD	00000	ORDER BY DESCRIPTION
W14	11793-20106	6	1	LO INPUT CABLE, SEMI-RIGID: J4 TO S1 (RIGHT SIDE: OPTION 011 ONLY)	28480	11793-20106
W15	11793-20107	7	1	RF INPUT CABLE, SEMI-RIGID: J5 TO S1 (OPTIONS 020 AND 021 ONLY)	28480	11793-20107
W16	11793-20108	8	1	IF OUTPUT CABLE, SEMI-RIGID: J7 TO S2 (OPTIONS 020 AND 021 ONLY)	28480	11793-20108
W17	11793-20109	9	1	LO INPUT CABLE, SEMI-RIGID: J6 TO U3 (OPTION 020 ONLY)	28480	11793-20109
W18	11793-20110	2	1	LO INPUT CABLE, SEMI-RIGID: J6 TO S1 (OPTION 021 ONLY)	28480	11793-20110
W19	11793-20111	3	1	LO INPUT CABLE, SEMI-RIGID: J4 TO U3 (RIGHT SIDE: OPTION 010 ONLY)	28480	11793-20111
W20	11793-60009	2	1	LO INPUT CABLE, FLEX: 35MM MALE (ACCESSORY)	28480	11793-60009
W21	11793-60006	9	1	IF OUTPUT CABLE, FLEX: 5M MALE (ACCESSORY)	28480	11793-60006
W22	8120-1838	8	1	CABLE ASSY-COAX 50-OHM 12-IN-LG JGK (ACCESSORY)	28480	8120-1838

See introduction to this section for ordering information. * Indicates factory selected value

Table 8. Code List of Manufacturers

Mfr Code	Manufacturer Name	Address		Zip Code
00000	ANY SATISFACTORY SUPPLIER			
01295	TEXAS INSTR INC SEMICOND CMPNT DIV	DALLAS	TX	75222
04713	MOTOROLA SEMICONDUCTOR PRODUCTS	PHOENIX	AZ	85008
06383	PANDUIT CORP	TINLEY PARK	IL	60477
16299	CORNING GLASS WKS COMPONENT DIV	RALEIGH	NC	27604
24546	CORNING GLASS WORKS (BRADFORD)	BRADFORD	PA	16701
24931	SPECIALTY CONNECTOR CO INC	GREENWOOD	IN	46227
27014	NATIONAL SEMICONDUCTOR CORP	SANTA CLARA	CA	95051
28480	HEWLETT-PACKARD CO CORPORATE HQ	PALO ALTO	CA	94304
3L585	RCA CORP SOLID STATE DIV	SOMERVILLE	NJ	
56289	SPRAGUE ELECTRIC CO	NORTH ADAMS	MA	01247
9D949	AMPHENOL SALES DIV OF BUNKER-RAMO	BROADVIEW	IL	60153

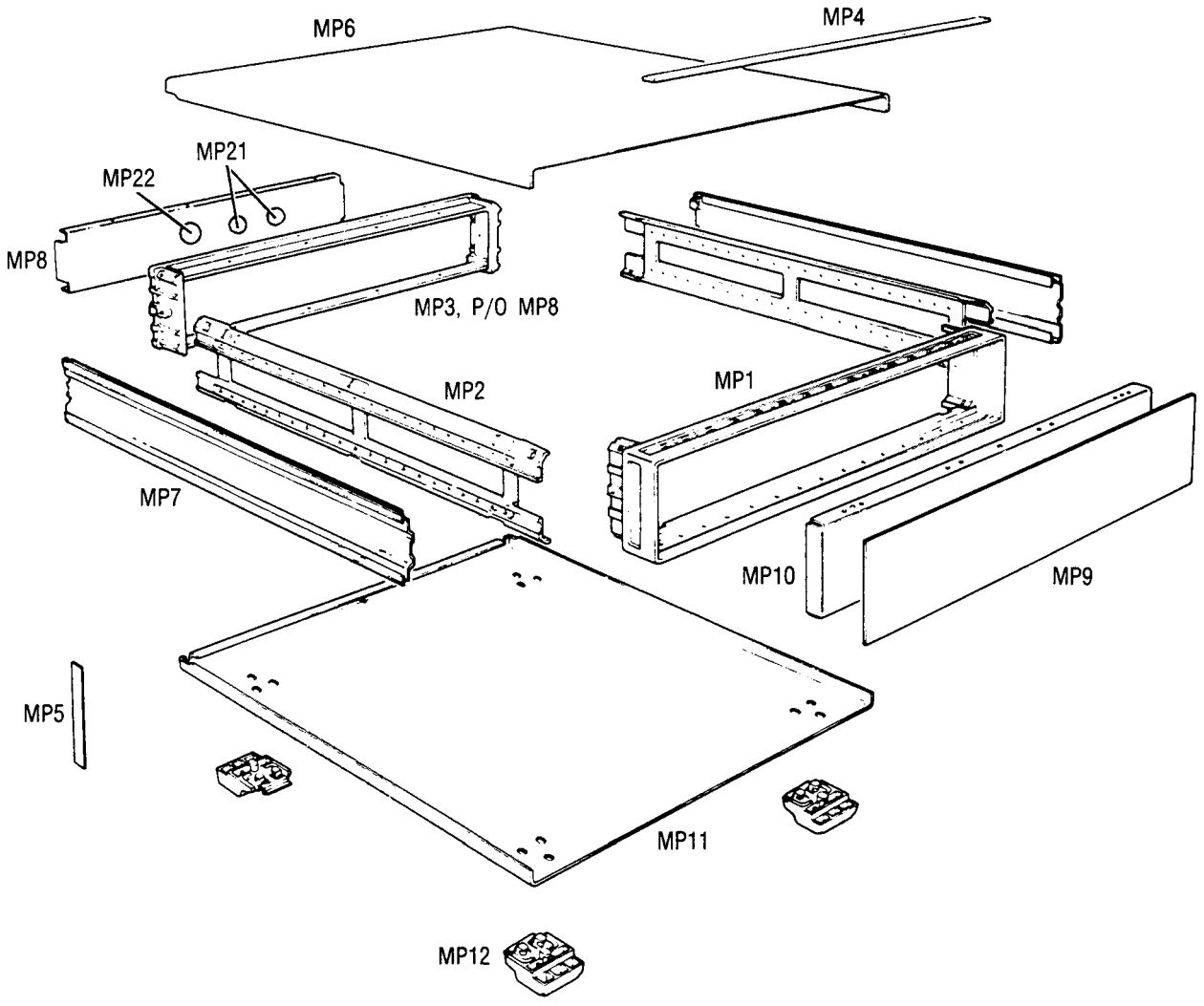


Figure 6. Cabinet Parts

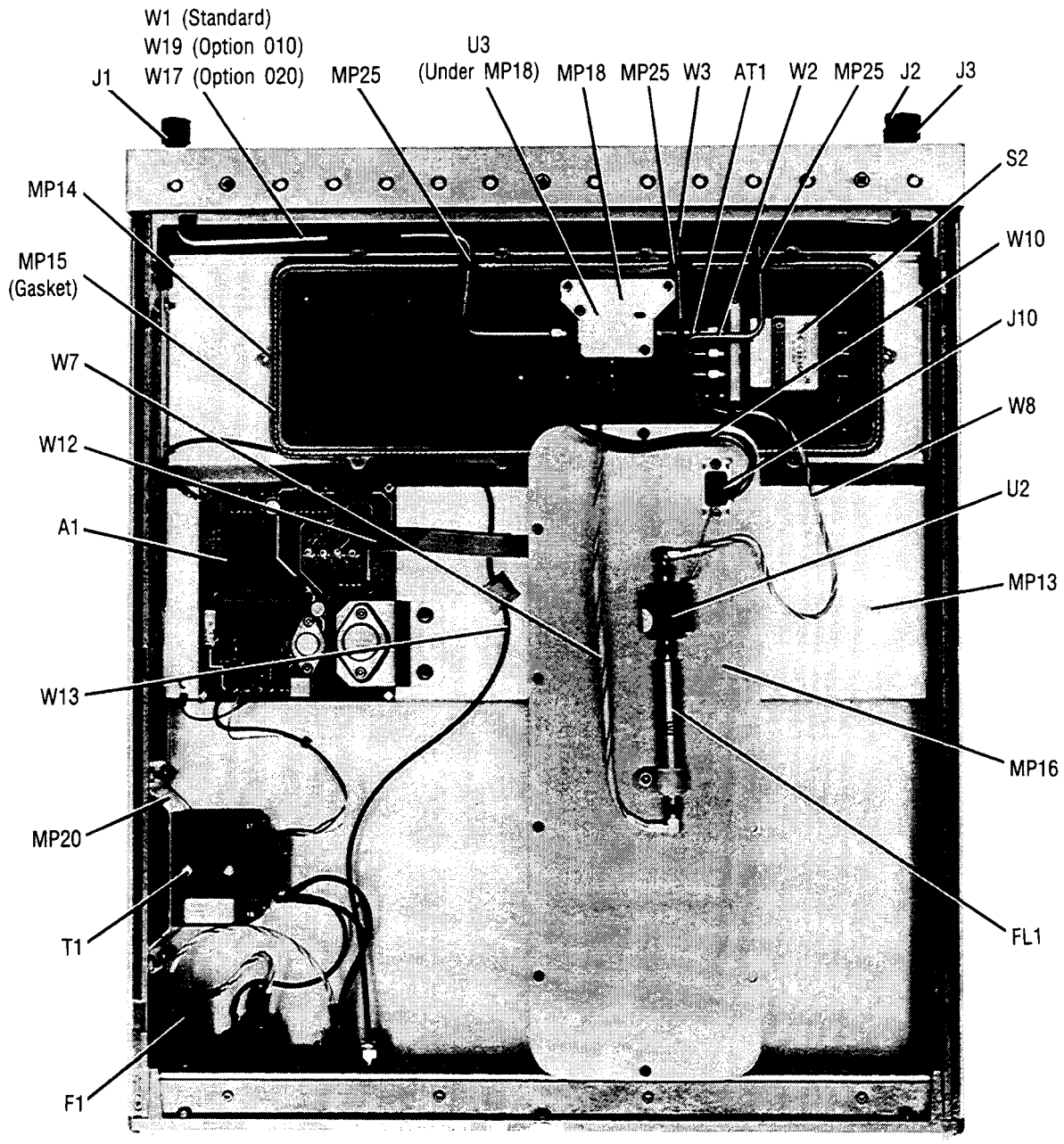


Figure 7. Illustrated Parts Breakdown for Standard and Option 010

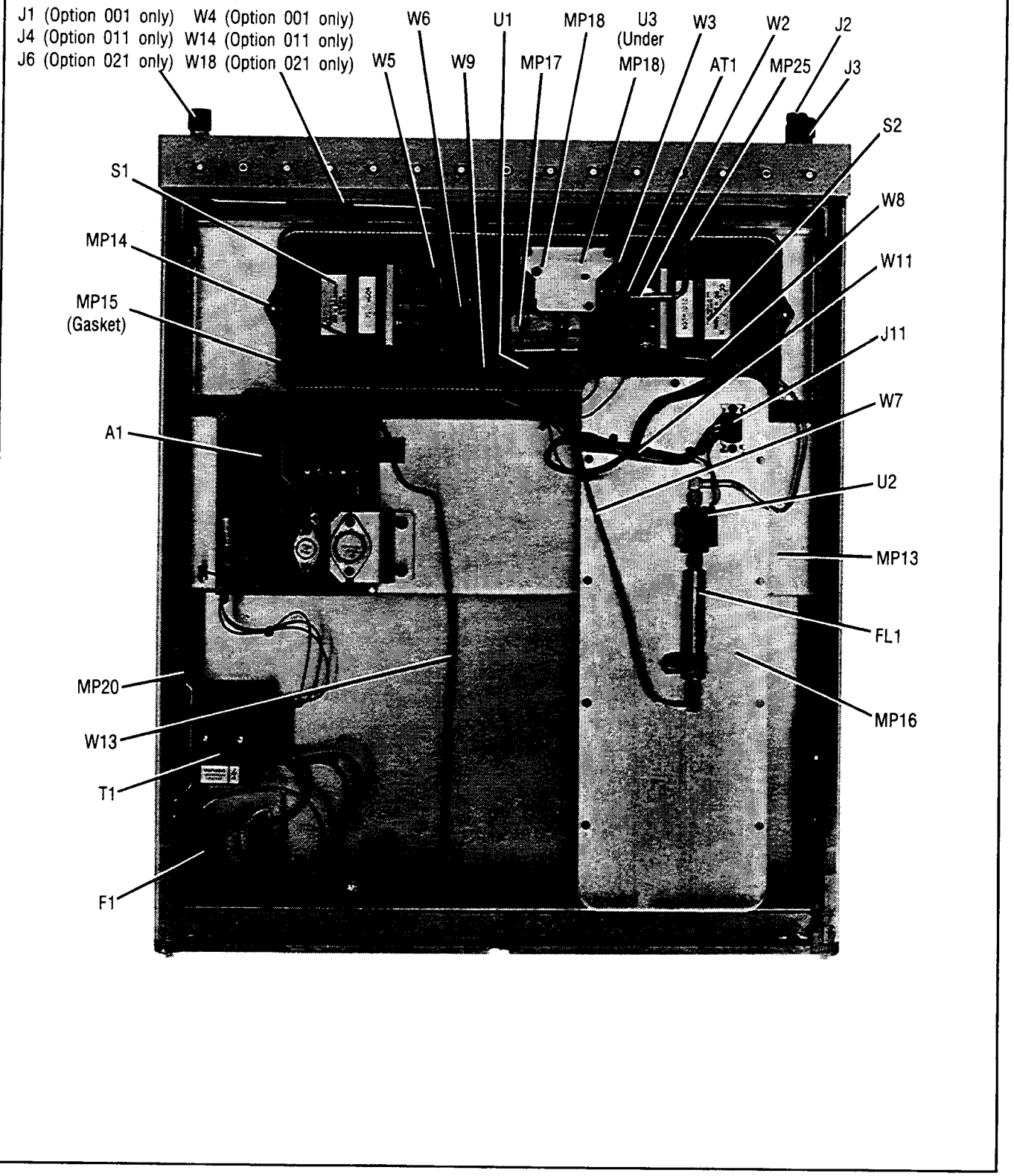


Figure 8. Illustrated Parts Breakdown for Options 001, and 011

30. Ordering Information

To order a part listed in the replaceable parts table, include the Hewlett-Packard part number (with the check digit) and the quantity required. Address your order to the nearest Hewlett-Packard office. The check digit will ensure accurate and timely processing of your order. To order a part that is not listed in the replaceable parts table, include the instrument model number, instrument serial number, description and function of the part, and the quantity of parts required. Address the order to the nearest Hewlett-Packard office.

31. Manual Changes

These paragraphs contain manual change instructions for backdating this manual for HP Model 11793A Microwave Converters with the serial number prefix 2407A.

Instruments with Serial Prefix 2407A have System II cabinet parts and hardware that are English thread. Instruments with Serial Prefix 2520A and higher have System II cabinet parts and hardware that are METRIC thread.

In Table 7. *Replaceable Parts*, both English and Metric thread part numbers are listed for the System II cabinet parts. These correct part numbers are referenced under the instrument's serial number prefix.

Instruments with the serial number prefix 2407A have MP3 (rear frame), MP8 (rear panel), and associated english thread hardware, that are screwed together. These parts have been changed to a riveted, one piece assembly that is referenced to MP8. To replace MP8 you must order the Rear Panel Assembly 11793-20009, and the metric screws for the side struts and rear feet.

32. SERVICE

33. Principles of Operation

Simplified Block Diagram

A simplified block diagram of the Microwave Converter is shown in Figure 10. The signal at the RF INPUT connector is routed through an input switch either to the Direct Path (and out the IF OUTPUT connector), or to the Down-Convert Path. The Down-Convert Path has a 3 dB RF Attenuator (to improve input SWR), a Mixer (the down-converter), an IF Low-pass Filter (to remove the sum component of the mixing process while passing the difference component), and a +15 dB IF Amplifier (to restore signal loss through the Down-Convert Path).

Usually, the LO frequency selected is higher than the frequency of the input signal. (The measuring instrument assumes this.) The difference frequency (the IF) is filtered by the IF Low-Pass Filter, which has a 3 dB corner of 800 MHz. The IF should be kept between the range of 10 and 700 MHz.

If the instrument has the optional LO Amplifier installed, the measuring instrument automatically switches in the amplifier whenever an LO frequency greater than 18 GHz is selected.

Service Sheets 1 and 2 (Input Signal Down-Converter)

A single input on the rear panel: the FREQ OFFSET INPUT, has three logic states which control both the switching of the RF two paths, and the insertion of the optional LO Amplifier. The Level Comparator senses the three states and drives the appropriate switches.

Service Sheets 1 and 2 are the schematic diagrams of the RF circuitry of the Microwave Converter. Service Sheet 1 (SS1) documents the standard Microwave Converter (without the LO Amplifier option), and Service Sheet 2 (SS2) documents the Microwave Converter with the LO Amplifier.

The operation of the RF components is discussed in the principles of operation for the Simplified Block Diagram above. Note that the RF switches (S1 and S2), shown in the schematic, automatically interrupt the current flowing into the energized solenoid once the plunger switches the RF contacts. The plungers latch via permanent magnets.

Service Sheet 3 (A1 Switch Control Assembly)

The Level Comparator (U1A and U1B) and Decoder (U3A, U3B, and U3C) decode a three level input (through the rear-panel FREQ OFFSET INPUT connector) into binary levels that control the RF switches (see SS1 and SS2). The AND gates (U2) are simply open-collector inverters, which drive the transistors (Q2, Q3, Q4, Q5) to switch on and energize the solenoids of the RF switches. Table 9 summarizes the decoding.

Table 9. Decoding of the Offset Frequency Input

RF Path	LO Amp	Level at FREQ OFFSET INPUT	U1A Pin 1	U1B Pin 6	U3A Pin 3	U3B Pin 6	U3C Pin 8	Q2	Q3	Q4	Q5
Direct	Out	<2.0V	H	L	H	H	L	Off	Off	On	On
Down-Convert	In	2.0 to 3.8V	H	H	L	L	H	On	On	Off	Off
Down-Convert	Out	>3.8V	L	H	H	L	L	Off	On	Off	On

The power supplies used are:

- The unregulated +26V supplies drive current to the RF switch solenoids, and is the input to the +12V Regulator.
- The regulated +12V is the only adjustable supply. It is the current input to the +5V Regulator as well as the reference from which both the Level Comparator references are derived, and the RF Amplifiers are powered.
- The regulated +5V supplies current to most logic devices.

Either the +26 or +12V supply can trigger the Over-Voltage Protection should the respective voltage exceed +42 or +12V. LED DS1 gives an indication that the supply is nominally operational.

34. Troubleshooting

WARNING

Primary AC power is present within instrument when line voltage power cord is connected to the instrument.

Maintenance described herein is performed with power supplied to the instrument and with protective covers removed. Such maintenance should be performed only by service-trained personnel who are aware of the hazards involved.

CAUTION

Use the correct torque wrench when installing sub-miniature connectors.

Do not exceed the following torque settings for this instrument:

1.5 N·m for the 3 mm (T10) screws
2.0 N·m for the 4 mm (T15) screws

0.7 N·m (6.3 in.lb) for SMA connectors
0.7 N·m (6.3 in.lb) for Type-N connectors

General

Troubleshooting information is broken down into three categories:

- RF devices,
- control devices, and
- power supplies.

Either a compatible measuring instrument or a power supply connected to the FREQ OFFSET INPUT, can be used to control the RF switches. If a power supply is used, set it to 0, +3, or +5 Vdc as dictated by Table 9.

RF Devices (Service Sheets 1 and 2)

Because of the diversity of test equipment and techniques available for troubleshooting the high-frequency devices, no specific procedures are given. Check the performance parameters of the RF devices against the following table, Table 10. Also check connectors and cables.

Table 10. Performance Parameters

Device	Performance Parameters to Check
AT1 3 dB Attenuator	Attenuation: 2.5 to 3.5 dB at 18 GHz 2.0 to 4.0 dB at 26.5 GHz SWR: <1.25:1 at 26.5 GHz
FL1 Low-Pass Filter	3 dB Corner: 900 to 1100 MHz Passband Insertion Loss: <0.25 dB at 800 MHz
S1, S2 Switch	Insertion Loss: <1.5 dB at 26.5 GHz SWR: <2.0:1 at 26.5 GHz
U1 LO Amplifier	Frequency Range: 18 to 26.5 GHz Gain: >11 dB SWR: <2.5:1
U2 IF Amplifier	Frequency Range: 10 to 700 MHz Gain: 14 dB SWR: <1.8:1
U3 Mixer	LO Frequency Range: 2 to 26.5 GHz RF Frequency Range: 1.3 to 26.5 GHz LO Power: >+8 dBm Conversion Loss: <10 dB SWR: <4:1

Control Devices (Service Sheet 3)

Set a power supply to 0 Vdc and connect it to the FREQ OFFSET INPUT connector. Set the supply to 0, +3, and +5 Vdc respectively, and compare the logic levels of the logic devices with those listed in Table 9. When specifically checking the drive transistors Q2, Q3, Q4, or Q5, note the following:

The switch solenoids automatically disconnect after completion of switching. Therefore, it is difficult to distinguish between a drive transistor that is on but not drawing current, or one that is off and not drawing current. The collector voltages will differ by only a few mV. If any of the transistors are known to be working, compare the on and off voltages of the suspected transistor against those of a known good one.

Power Supplies (Service Sheet 3)

Check the points indicated in the schematic diagram for dc level and ac ripple. Note that the +5V Regulator is dependent on the +12V Regulator.

Equipment

Refer to Table 4, *Recommended Test Equipment.*

35. Repair

Cleanliness

Do not handle the A1 Switch Control Assembly board more than necessary. If dirt or moisture from the hands comes in contact with the circuit side of the A1 board, the circuits may become inoperative. Do not use solder flux remover on the circuit board.

36. Cleaning the Control-Line Switch Contacts

These instructions pertain to switches S1 (in instruments with the LO amplifier option), and/or S2 (standard and LO amplifier option configuration) located within the RF module. See Figure 9, *Switch Contact Location.*

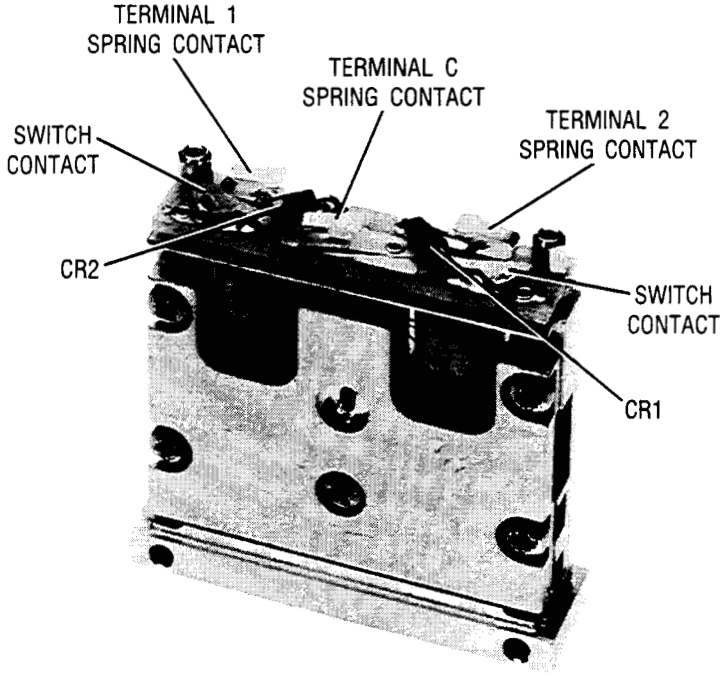


Figure 9. Switch Contact Location

1. Remove the switch from the RF module. Refer to Paragraphs 39 or 40, RF Module disassembly procedures.

2. Remove the two screws on the switch cover and remove the cover.

3. Saturate the edge of a sheet of durable paper with alcohol.

4. Insert the paper under one of the contacts, and while pressing gently on the contact, slide the paper through. *Do not allow the alcohol to run inside the switch assembly. Do not allow the paper to shred.* Do this several times and repeat for the other switch contact.

5. Saturate the edge of another sheet of paper with a freon-type degreaser and repeat step 4.

6. Remove any shreds of paper that may have lodged in the contacts.

7. Reinstall the switch cover. Note the orientation of the feedthrough terminals on the cover with respect to the switch contacts.

8. Replace the switch according to Paragraphs 41 or 42, RF Module assembly procedures.

37. Instrument Disassembly Procedure

The 11793A Microwave Converter uses metric connecting hardware in the form of 3 mm (T10) and 4 mm (T15) Torxhead screws (except for two small English thread Pozidriv screws mounting U1 to MP17). Use the Torxhead size T10 and T15 bits that are provided, to disassemble and re-assemble the instrument. The recommended torque wrench for use with the Torxhead bits may be ordered as HP part number 8730-0012.

The major component blocks of the 11793A Microwave Converter are MP14 (RF Signal Processing Module), A1 (A1 Switch Control Assembly), and T1 (Power Transformer). The RF module and the A1 assembly are mounted on MP13 (the Main Deck). The power transformer is mounted on MP2, the instrument chassis left side strut. See Figures 6, 7, and 8 to locate and identify parts and assemblies.

Note that Option 020 and 021 instruments differ from the standard and other option models in that the main deck and transformer locations inside the instrument are reversed when compared to the standard and other option models as shown in Figures 7 and 8. In Option 020 and 021 models, the RF module is in the rear of the instrument), and the transformer is mounted in the front left corner.

The following procedures allow the removal of the Microwave Converter components from within the instrument chassis.

1. Remove the top and bottom covers by loosening the screw in the middle of each cover rear edge. These are captive screws and will cause the cover to push away from the front frame. Slide each cover toward rear of the instrument to disengage, then lift up and away from the instrument.

2. Remove the side covers in the same manner as that of the top and bottom covers.

3. Remove the plastic trim from the top of the front frame by inserting a screwdriver into the rear slots and gently prying up the strip.

4. Disconnect J8 on the rear panel by removing the 9/16 inch retaining nut and lock washer.

5. Instruments with serial number prefix 2520A have MP8 (back panel) riveted to MP3 (rear frame). To remove the rear frame, unscrew the four corner screws that connect MP2 (side struts) to MP3. Pull off the two wires 05 and 0 (black/green and black) on the LINE VOLTAGE switch (both wires are of the quick disconnect type).

   For instruments with serial number prefix 2407A, remove MP8 (back panel) from MP3 (rear frame) by unscrewing eight screws. Pull off the two wires 05 and 0 (black/green and black) on the LINE VOLTAGE switch (both wires are of the quick disconnect type).

6. Turn the instrument around so that the front of the instrument faces to the operator's left. Desolder the 6, 5, 4, and 0 (blue, green, yellow, and black) wires from the A1 assembly.

7. To remove T1 power transformer and its mounting bracket, unscrew the four screws located on MP20 (mounting bracket). Separate transformer and the mounting bracket by removing the four long screws passing through the transformer case.

8. To remove the A1 assembly disconnect W12 (gray ribbon cable) at A1J1 board connector, unscrew the two screws at the VR3 heat sink, and turn the three board mounting stand-offs a 1/4 turn counterclockwise.

9. To remove MP13 (main deck) and MP14 (RF module), remove the six Torxhead screws located on the top and bottom of MP1 (front frame). Remove the six screws connecting MP2 (side struts) to MP13 (main deck). While supporting MP9, MP10 (front- and sub-panel) in one hand, carefully slide MP13 (main deck) forward through the front frame opening just enough to reach the inside cable connections.

CAUTION

Be careful that you do not bend the coax cables. Possible attenuation or interference of the RF signal may result.

   a. When inside connections can be reached, use a 5/16 open-end wrench to disconnect the semi-rigid coaxial cables from the front-panel connectors.

   b. Carefully set aside the front panel and slide the main deck assembly out of the instrument chassis.

   To remove the main deck on Options 020 and 021, disconnect the input cable connectors at the back panel. Remove the main deck screws, then lift one side of the Main deck up until it clears the side strut.

10. To remove MP14 (RF module) from MP13 (main deck), remove the four screws that hold the module to the main deck.

38. Instrument Assembly Procedure

Note that Option 020 and 021 instruments differ from the standard and other option models in that the main deck and transformer locations inside the instrument are reversed, when compared to the standard and other option models as shown in Figures 7 and 8. In Option 020 and 021 models, the RF module is in the rear of the instrument), and the transformer is mounted in the front left corner.

CAUTION

Use the correct torque wrench when installing sub-miniature connectors.

Do not exceed the following torque settings for this instrument:

1.5 N·m for the 3 mm (T10) screws,
2.0 N·m for the 4 mm (T15) screws.

1. Place the RF Module upside down with the semi-rigid coax cables pointing to the left. Position the main deck over the module with the four holes in the deck aligning with the four screw holes in the module base. (The A1 assembly mounting stand-offs on MP13 (main deck) should be upside down and on the opposite side of MP13 from the assembler.) Attach with four screws.

2. Take the main deck assembly (coax cables facing to the left) and slide into the main chassis through the front frame (the two notches indicate the bottom edge and should be down). When the coax cables are within two inches of the front frame edge, carefully connect the semi-rigid coax cables to their respective front-panel connectors, using a 5/16 inch open-end wrench.

   For Option 020 and 021 instruments, main deck reassembly is just the opposite of disassembly.

CAUTION

Be careful that you do not bend the coax cables. Possible attenuation or interference of the RF signal may result.

3. Carefully slide the main deck assembly into the instrument chassis until the front panel is within the front frame and the mounting holes are aligned. Attach the front panel with the six Torxhead screws: 3 top, 3 bottom.

4. Attach the main deck assembly to the side struts using the six screws: three screws to a side.

5. Turn the instrument over. With the three A1 assembly mounting stand-offs on the main deck (MP13) adjacent to the assembler, mount the A1 assembly to the main deck assembly. The three large holes in the A1 assembly must align with the three mounting stand-offs, and the heat sink holes must align with the deck mounting holes. Firmly seat the A1 assembly on the mounting stand-offs and lock the stand-offs by turning the screw heads a 1/4 turn clockwise.

6. Fasten the transistor heat sink to the deck with two screws.

7. Connect W12 to A1J1.

8. Mount transformer to the mounting bracket using the four long transformer screws. Mount the bracket to the left side strut at the third and eighth holes (counting forward from the rear frame) with four screws. Make sure that the transformer secondary wires (4, 5, 6) face the corner of the A1 Switch Control Assembly.

9. Replace rear frame assembly to the side struts by connecting with four screws at the frame corners. On instruments with serial number prefix 2407A, mount the rear panel to the rear frame using eight screws. Ensure that the panel is aligned so that the electrical hardware is in the same corner as the transformer.

10. Connect the black/green primary wire (05) on the transformer to the bottom right LINE VOLTAGE lug (underneath the white/brown/gray wire [918]). Connect the black primary wire (0) to the upper right LINE VOLTAGE lug.

11. Solder the colored secondary wires from the transformer to their respective solder pads on the A1 Assembly: yellow to 4, green to 5, and blue to 6. Solder the black wire to the GND pad.

12. Reconnect J8 (on W13) to the rear panel (in the FREQ OFFSET INPUT opening) using the 9/16 inch lock washer and nut.

13. Replace the side panels by centering each panel in the track formed by the side strut edges. Slide the panel from the rear forward until the captive screw on the rear edge of the panel is in contact with the rear frame. The screw should be in position to be tightened into the frame. The panel will move forward into place as the screw is tightened.

14. Replace the top cover by placing the cover onto the upper frame of instrument, then slide cover toward front of instrument. Tighten screw in middle of rear edge of cover while applying a slight upward pressure on the leading edge (to keep the edge from jamming on front frame). Guide cover into slot in the top of the front frame. Turn instrument over and repeat for the bottom cover.

39. RF Module Disassembly Procedure for Std, Option 010, & 020 Instruments

NOTE

When referring to switch ports: port #1 is the far left (SMA) connector, port #2 is the second SMA connector, etc., when holding the switch (label up) with the SMA connectors facing you.

1. Disconnect W12 (gray ribbon cable) at A1J1.

2. Remove module cover (MP16) by removing the ten cover screws.

3. Disconnect cables W7 and W8 using a 5/16 open-end wrench: W7 from U3 Mixer and FL1 Filter, W8 from U2 IF Amp and S2 Switch, port #4.

4. Unsolder orange wire from U2.

5. Remove U2 and FL1 from MP16 by removing the two screws securing U2, then loosening the filter clamp screw, and sliding the assembly out.

6. Disconnect the LO input semi-rigid coax cable (W1 in Standard instruments, W19 in Option 010 instruments, or W17 in Option 020 instruments) at U3, being careful not to bend, crimp, or kink the cable. The radio frequency interference (RFI) shielding grommet can be removed by slipping the grommet off of the cable via the cable access slit.

7. Repeat step 6 for W2 (RF/IF Output) at S2 port #3.

8. Repeat step 6 for W3 (RF Input) at S2 port #2.

9. Unscrew the two Torxhead screws that secure the MP18 mixer mounting bracket to the MP14 module base.

NOTE

Remember the order in which the stiffener bar and mixer bracket are assembled. The stiffener bar and mixer bracket assembly order is different between each brand of mixer used.

10. Disconnect U3 Mixer from AT1 Attenuator. U3 Mixer and bracket can then be disassembled.

11. Disconnect AT1 from S2.

12. Remove S2 from MP14 module base by removing the two corner screws.

13. Unsolder the three control wires (1, 2, 5) from S2.

14. Remove the Spira Shield (RF "EMI" gasket situated in the module base lip) only if damaged, or replacement of MP14 module base.

40. RF Module Disassembly Procedure for Option 001, 011, & 021 Instruments

NOTE

When referring to switch ports: port #1 is the far left (SMA) connector, port #2 is the second SMA connector, etc., when holding the switch (label up) with the SMA connectors facing you.

1. Disconnect W12 (gray ribbon cable) at A1J1.

2. Remove MP16 module cover by removing the 10 cover screws.

3. Disconnect cables W7 and W8 using a 5/16 open-end wrench: W7 from U3 mixer and FL1 Filter, W8 from U2 IF Amp and S2 Switch, port #4.

4. Unsolder the orange and white/orange wires (3, 93) from U2. Unsolder the gray and white/orange wires (8, 93) from U1.

5. Remove U2 and FL1 from MP16 by removing the two screws securing U2, then loosen the filter clamp screw and slide the assembly out.

6. Disconnect W9 from S1, port #1 and U1.

7. Disconnect the LO input semi-rigid coax cable (W4 in Option 001; W14 in Option 011; or W18 in Option 021) from S1, port #2, being careful not to bend, crimp, or kink the cable. The radio frequency interference (RFI) shielding grommet can be removed by slipping the grommet off of the cable via the cable access slit.

8. Disconnect W6 from S1, port #3 and U3.

9. Disconnect W5 from S1, port #4 and U1 (power terminal side).

10. Unscrew the two Torxhead screws that secure the U1MP17 Amplifier mounting bracket to MP14 module base. The U1 amplifier and bracket can then be removed.

11. Unscrew the two Torxhead screws that secure the MP18 mixer mounting bracket to MP14 module base.

NOTE

Remember the order in which the stiffener bar and mixer bracket are assembled. The stiffener bar and mixer bracket assembly order is different between each brand of mixer used.

12. Disconnect U3 from the Attenuator (AT1). U3 Mixer and bracket can then be disassembled.

13. Disconnect W2 from S2, port #3, being careful not to bend, crimp, or kink the cable.

14. Disconnect W3 from S2, port #2, being careful not to bend, crimp, or kink the cable.

15. Disconnect AT1 from S2, port #1.

16. Remove switches S1 and S2 from MP14 module base by removing the two screws that secure each switch.

17. Unsolder the control wires on each switch (6, 4, & 92 on S1; 5, 1, & 2 on S2).

18. Remove the Spira Shield (RF gasket situated in the module base lip) only if damaged, or necessary for MP14 module base replacement.

41. RF Module Assembly Procedure for Std, Option 010, & 020 Instruments

1. Spira Shield (RF gasket) replacement:

   Spira Shield is inserted into a groove in the module base (MP14). Within the groove at spaced intervals, are a series of rectangular protrusions called bosses. Insertion and seaming should begin and finish at a boss.

   a. Use finger protection (such as a rubber finger protector) when working with the Spira Shield.

   b. Start at a boss on a straight section of the groove. Push the shielding into the groove using a protected finger. Guide and twist the shielding to the next boss with the other hand.

   c. At the next boss twist the shielding into a tight curl, guide it through the groove, then allow the shielding to expand to hold itself in place.

   d. When an opening in the outer wall of the module is encountered, the shielding should be cut diagonally. Begin the threading procedure on the other side of the opening.

   e. Twist the shielding tighter when rounding corners.

2. Solder the three control wires to the S2 terminals as follows: green to 1, brown to 2, and red to C(+).

3. With the cable slots of the module facing towards the assembler, mount S2 (label up and the ports pointing to the center of the module) in the left hand side of the module base.

4. Connect AT1 to port #1 of S2.

5. Connect U3 to the mixer bracket, ensuring that the mixer side port (which connects to the IF output) faces opposite to the bracket mounting holes.

6. Connect U3 to AT1, but do not tighten.

NOTE

Mixer construction varies with manufacturer, and thus, is assembled within the RF Module differently. For example, a Norsal mixer has a stiffener bar placed between the mixer mounting bracket and the base mounting castings. An RHG mixer has a stiffener bar placed above the mixer mounting bracket.

7. Attach the mixer assembly to the module base, but do not tighten the screws.

8. Tighten the connection to AT1, then tighten the Mixer assembly screws.

9. Connect W1 (in Standard instruments), W19 (in Option 010 instruments), or W17 (in Option 020 instruments) to the right port of the mixer (cable slots in module should be facing assembler). Ensure that the radio frequency interference (RFI) shielding grommet cradles the cable in the slot with the cable access slit facing to the side.

10. Connect W2 to S2, port #3. Ensure that the RFI Grommet is in place as above in step 9.

11. Repeat step 10 for W3 to S2, port #2.

12. Attach U2 to the module cover.

13. Solder the orange wire to the U2 amplifier terminal.

14. Place filter clamp around FL1 and attach loosely to the cover.

15. Connect FL1 to U2. Tighten FL1 clamp.

16. Connect W7 to U3 and FL1.

17. Connect W8 to U2 and S2, port #4.

18. Secure module cover to base. Snug the screws down finger tight, then tighten the screws, working from the center out.

19. Connect W12 to A1J1.

42. RF Module Assembly Procedure for Option 001, 011, & 021 Instruments

1. For Spira Shield (RF gasket) replacement, refer to step 1 under Paragraph 41 above.

2. Wrap and solder the control wires to the S1 and S2 terminals as follows: blue to S1 terminal 1, yellow to S1 terminal 2, white/red to S1 terminal C(+);
green to S2 terminal 1, brown to S2 terminal 2, orange, white/red to S2 terminal C(+).

3. With the cable slots of MP14 RF module facing towards the assembler, mount S1 (label up and the ports pointing to the center of the module) in the right side of the module base; mount S2 in the left side of the module base. Secure the switches with the four long Torxhead screws.

4. Connect AT1 to S2, port #1.

5. Connect U3 to the mixer bracket, ensuring that the mixer side port (which connects to the IF output) faces opposite to the bracket mounting holes.

6. Connect U3 to AT1, but do not tighten.

NOTE

Mixer construction varies with manufacturer, and thus, is assembled within the RF Module differently. For example, a Norsal mixer has a stiffener bar placed between the mixer mounting bracket and the base mounting castings. An RHG mixer has a stiffener bar placed above the mixer mounting bracket.

7. Attach the mixer assembly to the module base, but do not tighten the screws.

8. Tighten the connection to AT1, then tighten the mixer assembly screws.

9. Assemble U1 HF LO Amplifier and the U1MP17 Mounting Bracket. Ensure that the U1 power terminal labels are up, and that the terminals face towards switch S2.

10. Attach and secure U1 Amplifier assembly to MP14 module base.

11. Connect W3 to S2, port #2 (cable slots in module should be facing assembler). Insure that the radio frequency interference (RFI) shielding grommet cradles the cable in the slot with the cable access slit facing to the side.

12. Connect W2 to S2, port #3. Ensure that the RFI Grommet is in place as described in step 11.

13. Connect W5 to the left port of U1 Amplifier and to S1, port #4.

14. Connect W6 to the right port of U3 mixer and to S1, port #3.

15. Connect the LO input semi-rigid coax cable (W4 in Option 001 instruments; W14 in Option 011 instruments; or W18 in Option 021 instruments) to S1, port #2. Insure that the RF grommet is in place as described in steps 11.

16. Connect W9 to the right port of U1 and to S1, port #1.

17. Attach U2 to MP16 module cover.

18. Solder both the orange and white/orange wires (3, 93) to the U2 amplifier terminal.

19. Place filter clamp around FL1 and attach loosely to the cover.

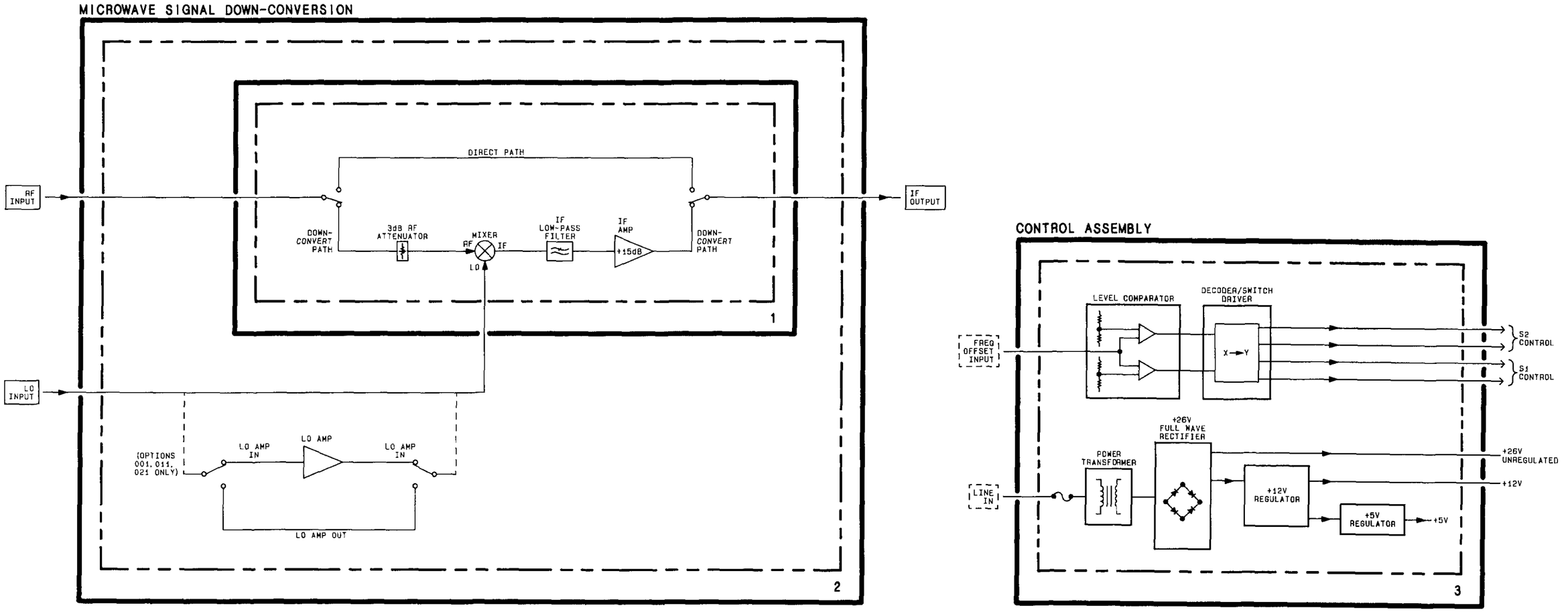
20. Connect FL1 to U2. Tighten FL1 clamp.

21. Connect W7 to U3 and FL1.

22. Connect W8 to U2 and S2, port #4.

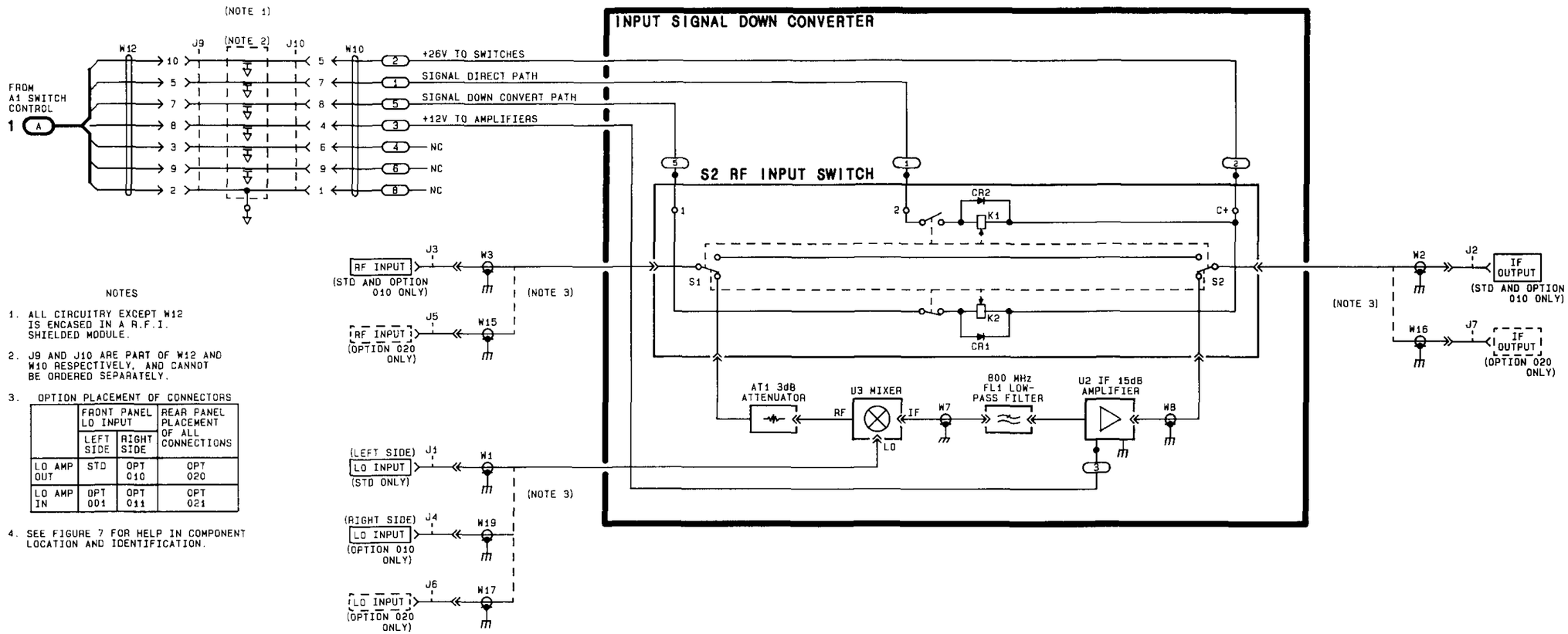
23. Secure module cover to base. Snug the screws down finger tight, then tighten the screws, working from the center out.

24. Connect W12 to A1J1.



BD1

Figure 10. MICROWAVE CONVERTER Simplified Block Diagram



NOTES

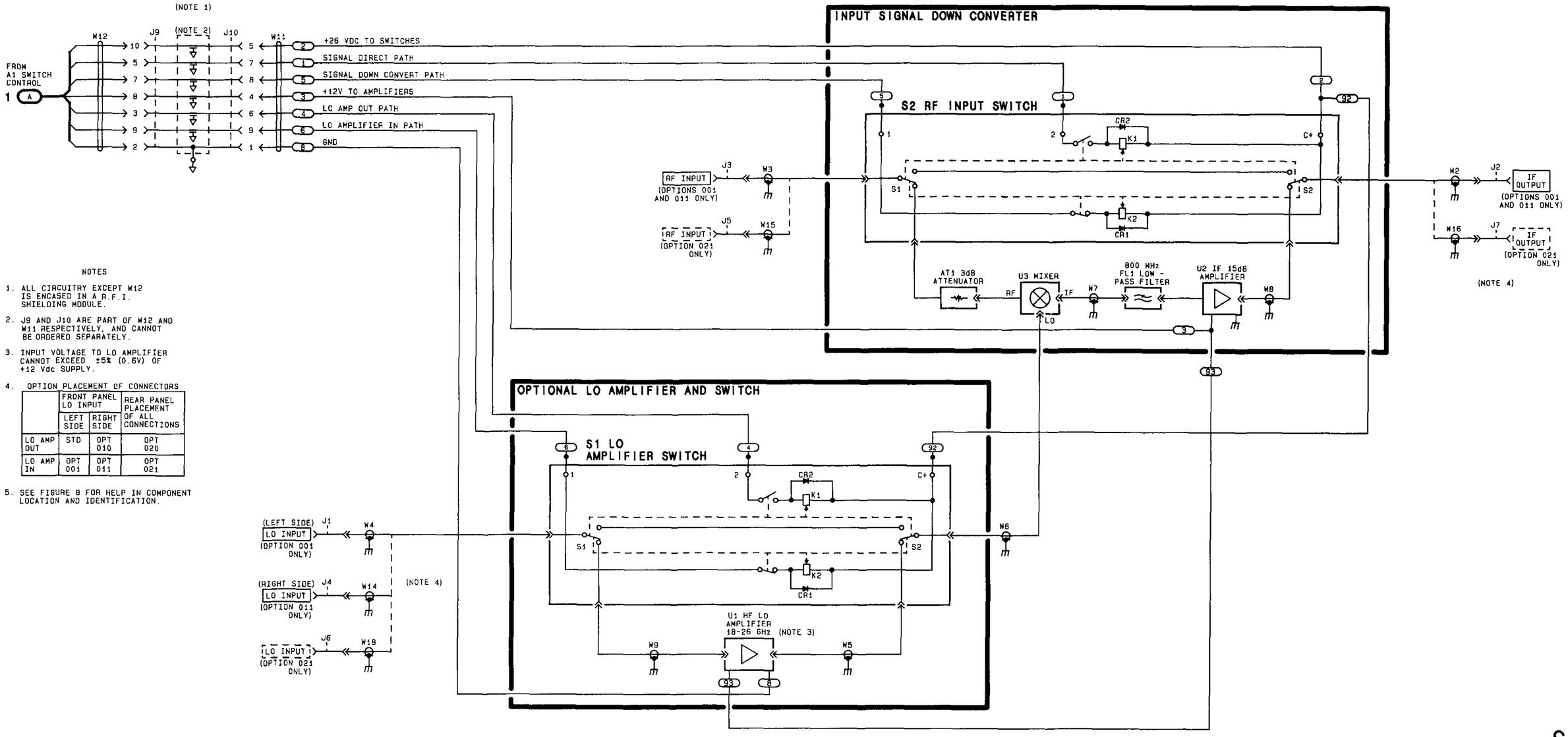
1. ALL CIRCUITRY EXCEPT W12 IS ENCASED IN A R.F.I. SHIELDED MODULE.
2. J9 AND J10 ARE PART OF W12 AND W10 RESPECTIVELY, AND CANNOT BE ORDERED SEPARATELY.
3. OPTION PLACEMENT OF CONNECTORS

	FRONT PANEL LO INPUT		REAR PANEL PLACEMENT OF ALL CONNECTIONS
	LEFT SIDE	RIGHT SIDE	
LO AMP OUT	STD	OPT 010	OPT 020
LO AMP IN	OPT 001	OPT 011	OPT 021

4. SEE FIGURE 7 FOR HELP IN COMPONENT LOCATION AND IDENTIFICATION.

SS1

Figure 11. INPUT SIGNAL DOWN CONVERTER (Schematic Diagram for Standard, Option 010, and Option 020)



NOTES

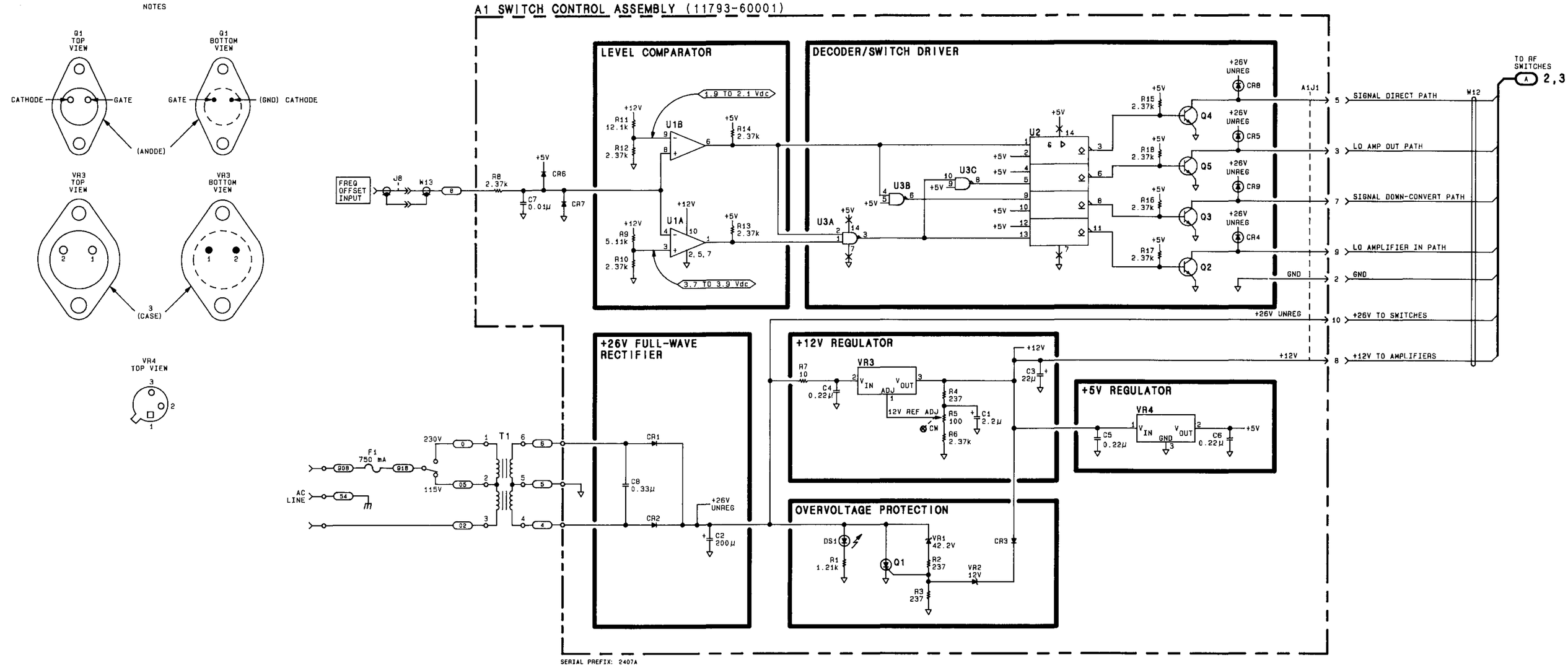
1. ALL CIRCUITRY EXCEPT W12 IS ENCASED IN A R.F.I. SHIELDING MODULE.
2. J9 AND J10 ARE PART OF W12 AND W11 RESPECTIVELY, AND CANNOT BE ORDERED SEPARATELY.
3. INPUT VOLTAGE TO LO AMPLIFIER CANNOT EXCEED ±5% (0.6V) OF +12 Vdc SUPPLY.
4. OPTION PLACEMENT OF CONNECTORS

	FRONT PANEL LO INPUT		REAR PANEL PLACEMENT OF ALL CONNECTIONS
	LEFT SIDE	RIGHT SIDE	
LO AMP OUT	STD	OPT 010	OPT 020
LO AMP IN	OPT 001	OPT 011	OPT 021

5. SEE FIGURE B FOR HELP IN COMPONENT LOCATION AND IDENTIFICATION.

SS2

Figure 12. INPUT SIGNAL DOWN CONVERTER (Schematic Diagram for Options 001, 011, and 021)



SS3

Figure 14. A1 SWITCH CONTROL ASSEMBLY, Schematic Diagram

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